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CTW 101

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CTW 101 SUBSYSTEM

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DESCRIPTION
INSTALLAT.
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PARTS

2

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CTW 101 SUBSYSTEM

TABLE OF CONTENTS (T.o.C.)
VOLUME 2

This volume is applicable to those products having the following model numbers:

- 0896294 E, 0896295 A, 0896296 N, 0896297 J

Binder 1,5 inch, 3 ring

Title window

T.o.C. P.N. 4.111.2.003.1

Description	
. PDS CTW 101	78A103055
. PDS MEM 170 + 180	300740300/A
Installation	4.111.0.001.0/A
Maintenance	4.111.4.001.0/A
. Preventive Maintenance Log	4.033.4.079.0/A
. Maintenance Schedule type G	4.014.4.647.0/A
. Lubrication Plan	4.014.4.648.0/A
Parts	4.111.5.001.0

22.12.1970

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SOTTOSISTEMA CTW 101

INDICE DEL VOLUME 2

Questo volume è valido per i prodotti aventi i seguenti codici:

- 0896294 E, 0896295 A, 0896296 N, 0896297 J

Raccoglitore da 1,5", a 3 anelli	
Finestra	
Indice	4.111.2.003.1

Descrizione	
. PDS CTW 101	78A103054
. PDS MEM 170 + 180 (Memoria Buffer)	300740301
Installazione	4.111.0.001.0
Manutenzione	4.111.4.001.0
. Piano di Manutenzione	4.033.4.079.0
. Scheda di Manutenzione tipo G	4.014.4.647.0
. Piano di Lubrificazione	4.014.4.648.0
Catalogo	4.111.5.001.0

22.12.1970

DESCRIPTION

1

78A103055

REVISIONI						REVISIONI					
REV	ORD. APPL.	DATA			FIRMA	REV	ORD. APPL.	DATA			FIRMA
		A	M	G				A	M	G	

P D S CTW 101

SALVO INDICAZIONE CONTRARIA DIMENSIONI: MILLIMETRI / INCH TOLLERANZE DIMENS. E DI FORMA VEDI: PROIEZIONE	MAT. TT. FIN.	
SCALA	COD.	DISEGNATO APPROVATO DISTR.

DESCRIZIONE
P.D.S. C T W 101

DISEGNO	PAG	REV
78A103055	1/88	A

Cod. 3896102X

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0.1. Documents to be enclosed

0.1.1. MEM 160 P.D.S. No. 300740300

0.2. Documents called for

0.2.1. "I51 Standard Peripheral Interface" Specifications No. 300740110

0.2.2. "Common requirements for the designing of GEISI Products" Specification No.30014030

0.2.3. "SCL1 Standard" Specifications No.300740400

0.2.4. TTY 33 TAJ Purchasing Specifications

0.2.5. Technical Manual 32 and 33 Teletypewriter sets.

1. GENERAL DESCRIPTION OF THE SUBSYSTEM

1.1. Introduction

The CTW 101 subsystem introduces the use of the console teletypewriter in the GE-100 line.
It is an input and output subsystem, which uses the interrupt automatism.
The messages in input are introduced from keyboard or from paper tape reader, while in output they are printed by the teletypewriter on a special paper medium.
The transmission is asynchronous with a maximum speed of 10 chrts/sec.
The transmission code is 7+1 bit code (ISO).

1.2. Composition

The subsystem consists of :

1) Teletypewriter - MIT 410
2) Console - TAV 480
3) Service module - VAR 580
4) Controller plus timer - GIT 100
5) Cabinet - CON 480
6) Ventilation group - VAR 640
7) Mains filter - ALI 290

1.3. Physical configuration

The subsystem is all contained in a cabinet designed in accordance with the GEISI standards for the appearance. Within the system, it has to be located always near the CPU panel so to allow an easy check by the operator.

1.4. Electric configuration

1.4.1. Signal distribution

The subsystem is connected to the CPU by means of the GE 100 interface through 4 cables arriving from the controller.

1.4.2. D.C. voltages

The subsystem takes from the central power supply of the system a +20 V voltage to supply the controller and the electronics of the teletypewriter.

1.4.3. A.C. voltages

A 220 V three-phase voltage is given to the subsystem to supply the mechanics of the teletypewriter and the relays contained in the service module.
The a.c. voltage to supply the controller ventilation is taken from the system.

1.4.4. Versions

As far as the power supply is concerned, there are two versions :

a) 220 V 50 Hz
b) 208 V 60 Hz

The teletypewriter TTY 33 TAJ is associated to the a)version and the TTY 33 TZ is associated to the b) version.

1.4.5. D.C. absorption

The electronics of the subsystem is supplied by the +20 V d.c. voltage taken from the system.
The absorption is 9.1 A.

1.4.6. A.C. absorption

The table below gives the maximum absorption in the two versions :

	220 V 50 Hz	208 V 60 Hz
PHASE X	1.27 A	1.34 A
PHASE Y	0.15 A	0.16 A
PHASE Z	1.20 A	1.26 A

1.5. Mechanic configuration

The subsystem sizes are :

- Height : 980 mm; this value represents the height of the cabinet while, with the mechanics set on top of it , it reaches 1065 mm.
- Depth : 700. In the upper part there is a nose which comes out for 93 mm.
- Length : 700 mm.

1.6. Weight

It weighs about 200 Kg.

1.7. Interfaces

This chapter gives the description of the interface towards CPU and of the interfaces between the various more significant elementary units.

1.7.1. GIT - CPU Interface

The connection between the controller and the CPU has been realized according to the procedures for the 100 line peripheral interface, whose functional description is contained in the PDS No.300740110.
The GIT, being an input-output controller plans for 4 cables of connection to the interface of the CPU and precisely the cables A,B,C,D.
The cable A (AIFUT, BIFUT.....) is in position A.02,
the cable B (AIFET, BIFET.....) is in position A.03,
the cable C (CAGUT, FINUT.....) is in position B.02 and finally
the cable D (PUOOT ....) is in position B.03.

For the signals meaning refer to chapt. 8.3.

1.7.2. GIT-VAR 580 interface

The controller is connected to the service module through a N.S. 107 cable which is fixed on connector J1 of the VAR 580 and on the connectors identified by positions C02 and C03 on the GIT 100.
The signals distribution at GIT level is as the one given on the table.

GIT side pin	CO2	CO3
01	INPUS	COPEL
02	RIMAS	FLAML
03	FUSES	RIPUS
04	TOVES	STADL
06	ZM CO2	ZT CO2
07	TELES	OVERL
09	ZM CO3	-
10	MANUS	OPERL
12	PISTS	-
13	ZM CO4	SEGEL
15	COPES	ZT CO3
16	AUTOS	INPUL

1.7.2.1. Signals meaning

AUTOS - It shows when the panel OPERATE push-button is pressed.

COPES - It shows at the closing of the chads drawer micro-switch.

FUSES - Signal of powering on of the d.c.'s. It shows because of the positioning of the relay due to the pressing of the ON push-button on panel.

INPUS - It shows when the INPUT push-button is pressed on panel.

MANUS - It shows when the STAND-BY push-button is pressed on panel

RIMAS	- Signal generated by the pressing of the ON pushbutton on panel
TELES	- Signal arriving from teletypewriter and generated by the switch of the transmission circuit of the teletypewriter itself.
PISTS	- Signal which copies the serialized character coming out from the controller; it reaches the teletypewriter and positions the printing electromagnets with its configuration.
COPEL	- It causes the switching on of the FULL-CHAD panel lamp.
FLAML	- It causes the switching on of the END OF BUFFER panel lamp.
INPUL	- It causes the switching on of the INPUT panel light
OPERL	- It causes the switching on of the OPERATE panel light
OVERL	- It causes the switching on of the OVERFLOW panel light
SEGEL	- It causes the switching on of the SEGE panel light
STADL	- It causes the switching on of the STAND BY panel light.

1.7.3. GIT - MEM 160 interface

The GIT is connected to the MEM 160 through four cables made on purpose and fixed in the positions given on the table;the table gives also the signals disposition :

GIT Side Pin	F02	F03	F04	F05	Git side
01	ME01	ME08	CI011	CI081	
02	ME0IN	ME08N	CI01A	CI08A	
03	ME02	TIBUN	CI021	-	
04	ME02N	TE02N	CI02A	CAGUA	
05	ME03	-	CI031	TE0OM	
06	ME03N	-	CI03A	CORI	
07	ME04	-	CI041	FIBEA	
09	-	GEP20	-	AIBU	
10	ME04N	GETR1	CI04A	BIBU	
11	ME05	GETR2	CI051	CIBU	
12	ME05N	GEVT2	CI05A	DIBU	
13	ME06	GEVTA	CI061	EIBU	
14	ME06	-	CI064	GIBU	
15	ME07	-	CI071	LIBU	
16	ME07N	-	CI07A	MIBU	
MEM 160 side Pin	A01	A02	B02	B01	MEM 160 side

1.7.4. VAR 580 - TAV 480 interface

J_2 - VAR 580

E	INPUS	W	LAOF
F	POUF	X	STADL
H	RIMAS	Y	TENI
J	TOVES	Z	OVERL
K	ZERO	AA	LAON
L	COPU	BB	OPERL
M	RIPUS	CC	LAOS
N	MANUS	DD	SEGEL
R	PUON	EE	TEN2
T	AUTOS	FF	INPUL
U	COPEL	HH	GROUND
V	FLAML	NN	GROUND

The connection between console and service module is obtained through a cable made on purpose for this connection.
The cable is soldered on the console side and fixed to the VAR 580 on the J2 connector.

1.7.5. VAR 580 - MIT 410 interface

The teletypewriter is connected to the VAR 580 through two cables, one which carries the a.c. voltage and it is fixed to the terminal box P3 of the VAR 580 and one which carries the signals from and towards teletypewriter, fixed to the terminal box P2 of VAR 580.
The signals position is given by the electric diagram VAR 580 dwg. No.78C102095.

1.8. Required environment conditions

1.8.1. Operating conditions

The temperature limits are : 10°-38 °C equal to 50° - 100 °F.
The humidity limits are : 20% - 80% without MEM
50% - 80% with MEM
Atmospheric pressure : 780 - 585 mm Hg.

Remark : the temperature and humidity variation speed must be such not to cause condensing of vapor on the unit.

1.8.2. Transport and storage conditions

In transport and storage conditions it may withstand temperatures ranging between 29 °C - 74 °C equal to - 20 °F - +165 °F.

Remark : the humidity and temperature variation speed must be such not to cause condensing on the unit.

The memory stack must be removed from the controller and kept in a special packaging. For the memory stack the temperature and humidity limits are as follows during storage and transport:

Temperature	-10°C - + 40 °C
	+14°F - +104 °F
R.H.	50% - 90%

Remark : before being used, the memory stack must be maintained for 4h. at these humidity and temperature limits :

Temperature	+20°C - + 30 °C
	+48°C - + 86 °F
Humidity	50% - 70%

For the other requirements refer to "Common requirements for the designing of GEISI products" No. 300140030.

1.9. Media handled

- The CTW 101 printing unit has a feed transport.
  The medium consists of a roll of paper having a maximum diameter of 5 in and a width of 8 1/2 in.
- The reader and punch need a standard 8 track and 1 in. wide tape.

1.10. Capacity related to the media

74 printing positions are planned with an horizontal spacing of 10 characters per inch.
The vertical spacing is of 6 lines per inch.
As far as the tape is concerned, it is punched with 10 codes per inch. and with 0.0465 in. diameter holes.

1.11. Limits on the tape medium

The paper tapes to be used in the input transfer phase must contain only the 64 characters of the graphic set plus, suitably arranged, the characters of CARRIAGE RETURN and LINE FEED.
Every block must not exceed the 255 characters and at the end it must always have the STOP character (X-OFF) ,also when the optional device is not to be used.
The paper tapes must have, at the beginning, a certain number of CR to simplify the positioning on the reader.
Should the tape contain characters outside the allowed graphic set, the signal SEGE of message wrong shows.
If the block has more than 255 characters, SEGE and OVERFLOW show, as from keyboard.

- The preparation of the paper tapes is to be done with the machine in STAND-BY (OFF-LINE).
- The paper tapes may be punched simultaneously to the printing (output phase) provided the software has sent as last characters of paper tape beginning (CR).
- After the X-OFF character a filling out character must be punched, should a reader with option be used.

- Using a reader without optional device, the paper tapes must contain only one block of information (always below the buffer capacity).

If several information blocks are used, i.e. when there is a case of a chain of normal characters, X-OFF, again normal characters, the reader does not stop with X-OFF, but only at end of tape; but the buffer receives only the characters preceding the X-OFF.

1.12. Options

The only option is the one of the device to obtain the automatic reader, which allows to stop the reading from tape when a special X-OFF character shows.
The character following X-OFF is read and the stop occurs on the second charcater after X-OFF. With such a device, the tape stops at the reading of X-OFF, while the stop occurs positioning the reading head on the second character after X-OFF. It is therefore evident that if on a tape several blocks are to be used, at every X-OFF a filling in character must follow, to avoid to lose any information.
The reader is activated again, after X-OFF, positioning the lever of the related panel in MANUAL START. In this case, the first character which enters the buffer is the one on which the reader has stopped(i.e.the second after X-OFF).

2. TELETYPEWRITER (MIT 410/A)

The CTW 101 subsystem uses as teletypewriter the TTY 33 TAJ and TTY 33 TZ models respectively in the 50 Hz and 60 Hz versions manufactured by the TELETYPE CORP.
The two models are very similar except, of course the main motor.
The motors used in the two versions present the same characteristics of absorption and power and also the same sizes.
In addition, it is necessary to note that while the 33 TZ model is supplied complete, the 33 TAJ model does not have the stand and the chad box.

2.1. Composition

The teletypewriter, in both versions, consists of :

- Keyboard
- Distribution, transmission, reception and printing unit
- D.O.E.
- Paper tape reader
- Paper tape punch

2.2. Keyboard (fig.1)

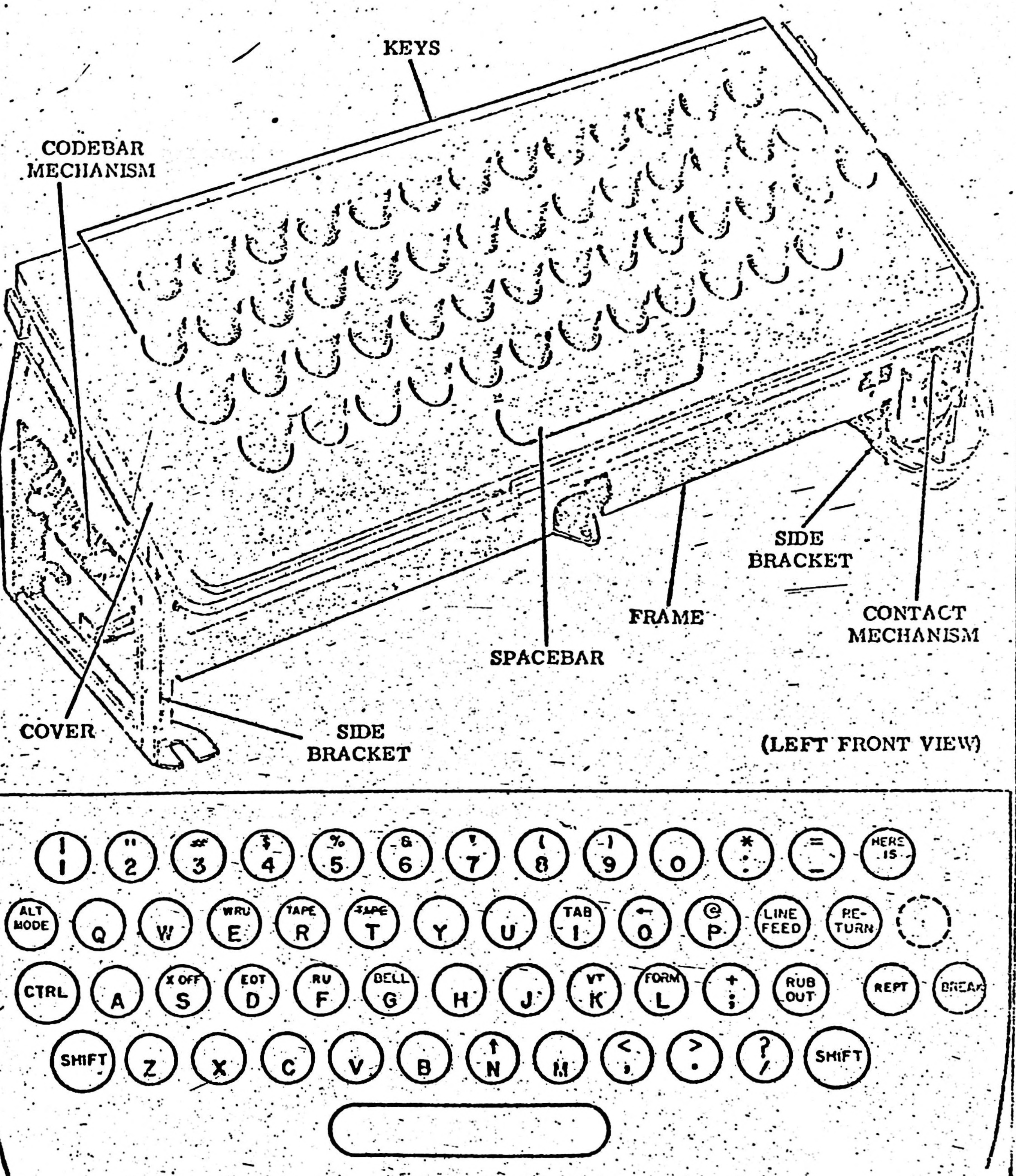

KEYS
CODEBAR MECHANISM
SIDE BRACKET
CONTACT MECHANISM
FRAME
SPACEBAR
COVER
SIDE BRACKET
(LEFT FRONT VIEW)
! 1
" 2
# 3
$ 4
% 5
& 6
' 7
(8
) 9
0
* :
= -
HERE IS
ALT MODE
Q
W
WRU E
TAPE R
TAPE T
Y
U
TAB I
← O
@ P
LINE FEED
RE-TURN
CTRL
A
X OFF S
EOT D
RU F
BELL G
H
J
VT K
FORM L
+ ;
RUB OUT
REPT
BREAK
SHIFT
Z
X
C
V
B
↑ N
M
< ,
> .
? /
SHIFT

fig. 1

2.2.1. General

The keyboard allows the introduction of messages pressing the related keys together with special keys.
The keys are 52 arranged in 4 rows.
Under the four rows there is a bar which serves to insert a space between the different printing characters.
The special keys used are :

- SHIFT
- CTRL

SHIFT serves to print the characters which are located in the upper part of the keys.

CTRL is a key which allows the introduction of the control functions codes.

In the model used, the application of the ESCAPE (ESC) sequence is not planned, therefore the ESC Key is considered as a key by itself and not as a special key.

2.2.2. Operation

The purpose of the whole keyboard mechanism is the one to store mechanically the code of the pressed key.
In fact, when a key is pressed, the "codebar mechanism" is positioned, i.e. an assembly of double bars which serves to transmit the character code, according to their position.
The "codebar mechanism" mechanically transmits the character code to the "keyboard contact mechanism".
The character code going to the "Distribution mechanism"in the printing unit comes out in parallel from the "keyboard contact".
If the operator presses two keys simultaneously it provides to inhibit the code transmission and no character is sent.

2.2.3. Type of information which can be transmitted from keyboard

Allowed set : it is defined as allowed set the assembly of the characters of the graphic set plus the check functions X-OFF and EOT and the special functions CARRIAGE RETURN and LINE FEED (see table I).

Characters : the 63 symbols included in the graphic set are defined as characters; they are obtained pressing the specific keys with or without the Shift Key.

Control Functions : the control functions are these special codes which are obtained pressing the specific key together with the CTRL Key.
The CTW 101 subsystem uses only the X-OFF and EOT functions.

Special Functions : they are functions used rather frequently, therefore they are obtained pressing the special key without inserting any other key. They are for the CTW 101 subsystem, Line Feed, Carriage Return and Repeat Character.

2.2.4. Performances of the keyboard without inserting the special keys

In the CTW 101 subsystem, the keyboard, without inserting the special keys, has the following performances :

- No key locked
- 42 characters are printed (in the keys with two characters the lower one is printed)
- The control functions are not activated
- The special functions are activated

LINE FEED = it performs the single spacing
RETURN = it performs the carriage return
REPT = it allows to repeat a character. The REPT key must be pressed before the one of the character to be repeated.

					0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
				1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
				g	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1
				f	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1
				e	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
	d	c	b	a																
0	0	0	0	0							Ø	0	@	P						
1	0	0	0	1							!	1	A	Q						
2	0	0	1	0							"	2	B	R						
3	0	0	1	1							#	3	C	S						
4	0	1	0	0							$	4	D	T						
5	0	1	0	1							%	5	E	U						
6	0	1	1	0							&	6	F	V						
7	0	1	1	1							'	7	G	W						
8	1	0	0	0							(	8	H	X						
9	1	0	0	1							)	9	I	Y						
A	1	0	1	0	LF						*	:	J	Z						
B	1	0	1	1							+	;	K	[						
C	1	1	0	0							,	<	L	\						
D	1	1	0	1	CR						–	=	M	]						
E	1	1	1	0							.	>	N	↑						
F	1	1	1	1		S7					/	?	O	→						

Table I

2.2.5. Keyboard performances with the SHIFT key inserted

Inserting the SHIFT key, the keyboard gives the following performances :

- the keys associated to one character only are locked
- the remaining 21 characters are printed; 18 of these are indicated in the upper part of the various keys, the other three are not indicated on the keyboard but they are obtained pressing special keys with the SHIFT key inserted and in particular :
  - pressing K [is printed
  - pressing FORM \ is printed
  - pressing M] is printed
- the control function keys are locked
- the special function keys are locked except REPT.

2.2.6. Keyboard performances with the "CTRL" key inserted

The following performances are obtained from the CTW 101 keyboard with the "CTRL" key inserted :

- those keys corresponding to characters with the sixth bit at 1 are locked
- therefore the keys of the following characters are not locked :

  W, Y, U,O,P,A,H,K,L,Z,X,C,V,B,N
  Q: it sends the code of X-ON
  J: it sends the code of LINE FEED and it performs the function
  M: it sends the code of RETURN and it performs the function
- the control function keys are not locked, and in particular X-OFF and EOT
- the special functions LINE FEED, RETURN, REPT are activated.

2.2.7. Meaning of the control functions used in the CTW 101 subsystem

X-OFF = It is assumed by the operator to indicate the end of the introduction of a correct message.
If the paper tape is used, X-OFF must be the last code punched and stays to indicate, also in this case, end of correct message.

EOT = If the operator realizes to have introduced a wrong message, he may signal its presence pressing the EOT key. It is therefore end of transmission for wrong message.

2.2.8. Introduction speed

The introduction speed depends on the operator typing speed.
The maximum allowed speed is 10 characters/second.

2.3. Distribution, transmission, reception and printing unit (Typing unit)

2.3.1. Transmission code

The CTW 101 subsystem teletypewriter uses the ASCII code with 7+1 bit (fig.2).
All the information forming the message (reader,numbers, symbols, control functions, special functions) are represented by a suitable combination of 7+1 bits.
The last bit has the parity check function.
All information coming out from the teletypewriter are then completed by a START bit which precedes the 7+1 code bits and by two final STOP bits.
Out of the $2^7 = 128$ possible transitions, 64 are assigned to the characters of the graphic set; out of the remaining 64, part has been assigned to the control functions or to the special functions and part has not been used forming the

zone out of the allowed set, as it can be seen on fig. 2 .

2.3.2. General characteristics of transmission and reception

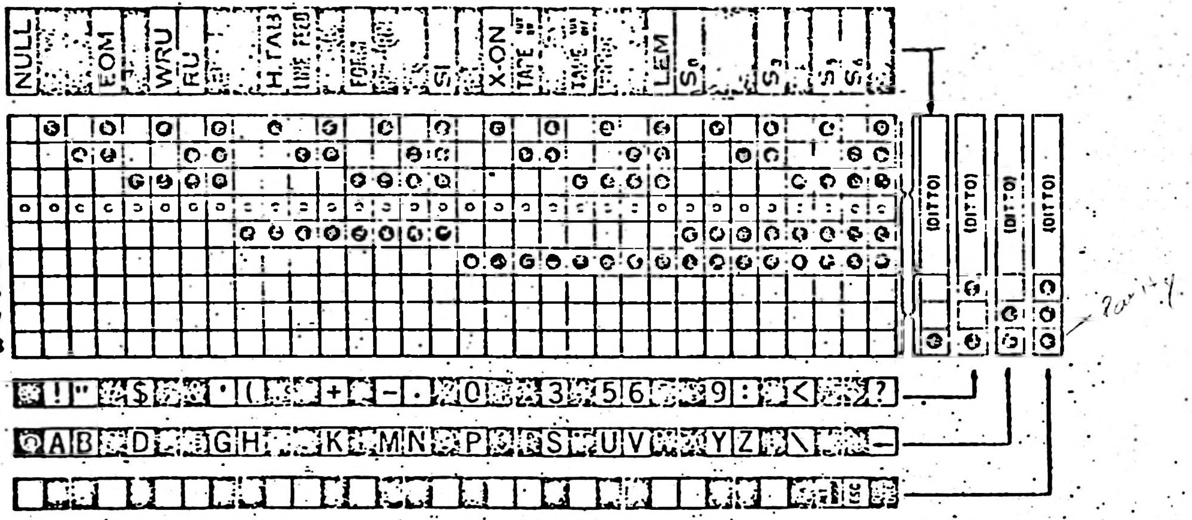
The nominal period of a bit lasts 9.09 ms therefore the total nominal period of a character lasts 99 ms.
The maximum allowed tolerance is 405 µs per bit.
These values are valid both for the signals that the teletypewriter sends to controller and for those that the controller generates towards the teletypewriter.
The teletypewriter operates with a 20 mA current; variations of ± 10% on the nominal value of the current do not interfere on the normal trend of the transmission.
The characters sent from keyboard go towards the controller and at the same time are deviated by the controller through the echoplex network towards the teletypewriter printer.
Such a type of operation requires the possibility to have a simultaneous traffic of information on two distinct channels.
For such reason, the full-duplex transmission type is used.

2.3.3. Distribution

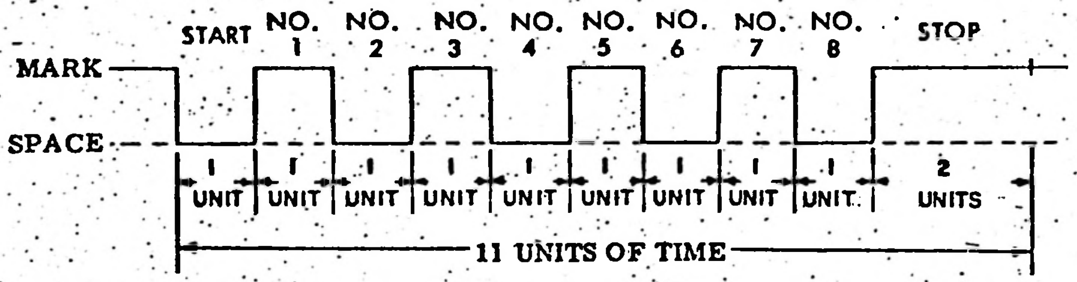
It is accomplished by a motor and a mechanism sequence.
The motor is three-phase synchronous with energizing circuit in parallel and it has the following characteristics.

Power supply : 115 V a.c. ± 10% 50÷60 Hz ± 0.45
Input current : 2A
Power(output) : 33 m HP
Speed : 3600 rpm
Power factor : 0.40

The motor revolution is transferred to the distribution shaft and then to the main shaft.
The distribution shaft gives the movement to the keyboard and to the distributor.



CHARACTER ARRANGEMENT (ASCII CODE)



CURRENT WAVE FORM FOR LETTER "U" (WITH "EVEN PARITY")

Figure 2 — Teletypewriter Code (8-Level)

The main shaft gives the movement to the other parts of the TYPING UNIT.

2.3.4. Transmission

Pressing a key, as previously seen, the corresponding code is obtained in parallel with the output of the "KEYBOARD CONTACT". Such an output goes to the "DISTRIBUTOR MECHANISM" which serializes the information according to the standards related to the message structure. At the distributor output there is therefore a wave-form of the type of fig. 2.

2.3.5. Reception

The signals arriving from the outside or those obtained pressing the keys, reach the "SELECTOR MECHANISM" moved by the main shaft.
The "SELECTOR MECHANISM" connects, through an electromagnet and various mechanisms, the information received electrically in a position of the "CODEBAR MECHANISM" located on the TYPING UNIT.
The information is now mechanically contained in the "CODEBAR MECHANISM".

2.3.6. Printing

2.3.6.1. The characters used for the printing are etched on the cylindrical surface of the printing head (fig.3).
Depending on the code stored in the "CODEBAR MECHANISM"the printing head assumes a specific angular and vertical position.
These positions are obtained by means of a "ROTARY MECHANISM" and a "VERTICAL MECHANISM" checked by the "CODEBAR MECHANISM".

▾	&	%	$	#	▾ ▾	!	AM SP	(	)	*	+	,	-	.	/
G	F	E	D	C	B	A	@	H	I	J	K	L	M	N	O
7	6	5	4	3	2	1	0	8	9	:	;	<	=	>	?
W	V	U	T	S	R	Q	P	X	Y	Z	[	\	]	↑	←
8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8

CLOCKWISE COUNTERCLOCKWISE

VERTICAL ROWS

(SHOWN IN STOP POSITION)

fig. 3

Once the printing head has reached the required position, which occurs in the first half of the printing cycle, it receives from a hammer the stroke to print the character on the paper.

2.3.6.2. Every time a function code is recognized the "PRINT SUPPRESSION MECHANISM" does not allow the striking hammer to reach the printing head.

2.3.6.3. When the CARRIAGE RETURN code is recognized, the CARRIAGE RETURN MECHANISM is inserted which brings back the carriage to the starting point (all to the left) without performing the LINE FEED.

2.3.6.4. When the LINE FEED code is recognized, there is a mechanism which accomplishes the LINE FEED.

2.4. D.O.E.

It consists of :

a) power supply
b) current amplifier (SELECTOR MAGNET DRIVER)

2.4.1. In the CTW the D.O.E. power supply is taken directly from the VAR 580 service module.

2.4.2. The SELECTOR MAGNETIC DRIVER purpose is to amplify the 20 mA pulses received from the line in order to allow the se-

lector activation.
It is a two-stage switching amplifier.
At the output there is a 500 mA current.

2.5. Paper tape reader

It is located at the left of the keyboard; it has its own power supply contained in a special box fixed to the cabinet.
It has a three-position manual switch which has the following applications :

- in the FREE position the FEED WHEEL is free to allow the movement of the paper tape ;
- in the STOP position the wheel is fixed and the reader is not activated ;
- moving the lever on the START position the reader is activated starting to read the character which is in correspondence with the SENSING GUIDE PIN.

2.5.1. Characteristics

Speed 10 chrts/sec.
End of tape mechanism : the reader stops at the end of tape unless there is the optional device.
Operating sequence : read, feed.

2.6. Paper tape punch

2.6.1. It is located to the left of the keyboard
It has its own panel with four keys.

ON = it serves to activate the tape punch

OFF = it serves to de-energize the tape punch
RELEASE = it serves to position correctly the paper tape
BACK SPACE = it serves to make the tape return of one or more positions.

2.6.2. Speed : 10 chrts/sec

Supply from the POWER SUPPLY
Operating sequence : feed and punch

2.7. Electric configuration

2.7.1. Signals distribution

The teletypewriter is connected to the controller by means of a cable which arrives to the service module on the P3 terminal box.

2.7.2. A.C. voltage

The teletypewriter takes the a.c.voltage from the service module by means of a special cable which is fixed to the P2 terminal box of the VAR 580.
It is the same cable supplied together with the machine, suitably modified.

2.8. Documentation

For more details on the teletypewriter operation, refer to the machine documentation consisting of :

- TECHNICAL MANUAL (2 volumes)
- CATALOG and PARTS LIST
- WIRING DIAGRAM which supplies the machine electric diagrams
- ACTUAL WIRING DIAGRAM which is a detailed view of all the connections

3. OPERATING PANEL (TAV 480/A)

3.1. General

It supplies the indications of the subsystem operating status. In addition, it serves to make the subsystem available to the operato and to evidentiate the anomalous conditions and the malfunctions. It is located on the right side of the cabinet and it has push-buttons and light signal arranged on three rows.

3.2. Arrangement

The panel presents a configuration as shown in the diagram below :

OFF	STAND BY	INPUT
ON	OPERATE	OVERFLOW
SEGE	END OF BUFFER	FULL CHAD

3.3. Composition

It presents 6 push-buttons with enclosed light signal(ON,OFF, STAND BY, OPERATE, INPUT, OVERFLOW) and three light signals without push-button (SEGE, END OF BUFFER, FULL CHAD.).

3.4 Description

3.4.1. Lights and status push-buttons

1. OFF : monostable push-button with incorporated yellow light. If pressed, it causes the interruption of the local voltages. The signal goes off if the mains are not present or ON is pressed.

2. ON : monostable push-button with incorporated yellow light. If pressed, it allows the a.c. power supply to the subsystem. The subsystem remains in the ON status when releasing the push-button only if there is the +20 d.c. voltage.

3. STAND BY : monostable push-button with incorporated blue light. If pressed, it causes the passage to the manual status allowing to finish the possible operations underway. When ON is pressed, the manual condition automatically disappears.
The blue associated light turns on :
a) when passing from the automatic status to the manual status.
b) when the full chad drawer condition occurs.
c) when powering on the subsystem.

4. OPERATE : monostable push-button with incorporated green light.
When pressing it, it brings the subsystem in automatic, if there are no out-of-service conditions.
The light goes off when the STAND BY push-button is pressed because of conditions which bring the subsystem to the manual status or when the OFF status is reached.

3.4.2. Maneuvering lights and push-buttons

INPUT : monostable push-button with incorporated sky-blue light.

It works only if the subsystem is in OPERATE. If pressed, it allows to have the teletypewriter available when the subsystem is available The light turns on when the CPU sends the"Set input" command.
It goes off :

a) when X-OFF is pressed
b) when EOT is pressed
c) with the OVERFLOW condition
d) with the BREAK command

END OF BUFFER : white intermittent light which starts to pulse when the operator fills the 240th position of the buffer.
It goes off because of the same causes that switch off INPUT.

3.4.3. Lights and push-buttons for abnormal conditions and malfunctions

OVERFLOW : monostable push-button with red incorporated light.

- If pressed, it allows to remove the overflow status.
- The light goes on if the operator, after the last character (the 255th), does not press the X-OFF key and when he presses the key ← ,of character erasing, with the memory addresser in position zero.

FULL/CHAD : red lamp.
It turns on when the subsystem goes to the manual status because of the full-chad drawer condition; it goes off eliminating the cause which has generated it and setting the subsystem in automatic.

SEGE : red lamp which turns on because of the following conditions :
- wrong message
- wrong message because of overflow
- parity check error from TTY
- character outside the allowed set

- check error in output from buffer
The light goes off upon the arrival of the commands of SET INPUT or of transfer in OUTPUT.

3.5. Electric configuration

The panel is connected by means of a cable to the services module.
For the electric description of the panel refer to the assembly drawing of the TAV 480/A

4. SERVICES MODULE (VAR 580/A)

4.1. General

The services module is an intermediate unit which accomplishes several functions among which the main ones are :

- supply the 115 V 50 - 60 Hz voltage for the teletypewriter;
- supply the +24 V voltage which allows the interruption of the a.c.'s or their connection to the subsystem.

4.2. Composition

Refering to the electric diagram VAR 580 drawing No.78C102095, it contains :

- a transformer T1 220/24
- an autotransformer T2 220/115
- 7 fuses
- a T1 switch
- a RL1 relay
- two 82Ω resistors
- 3 terminal boxes P1,P2,P3
- 3 connectors J1,J2,J3

4.3. Functional characteristics

When the subsystem is powered off, the OFF lamp stays on.The OFF lamps are supplied by the 24V voltage which is taken from T1 through the contact 1-4 of RL1 (LAOF).
In order to power the subsystem on, it is necessary to press the ON push-button, this makes the TL1 switch work as PUOF goes to +24 V.
The closing of the contact 1-2 of TL1 grounds LAON, therefore the ON lamp turns on on the panel if there is the +20 (TENI) d.c. voltage which is taken from the system;simultaneously,the re-

lay RL1 is energised.
The movement of RL1 determines the fall of LAOF, therefore the OFF light goes off and COPU raises to + 24V.
When the ON push-button is released the TL1 switch stays energised through COPU and the ON lamp stays lit. Through the contact 8-6 of RL1 the signal FUSE is grounded.
Now the subsystem is on.
To switch it off, it is enough to press the OFF push-button: TL1 is de-energised, ON is turned off and OFF is turned on.
The subsystem powering on brings automatically present the a.c. to the teletypewriter. In fact, energizing TL1 through contacts 6-6 and 3-4 the 220V voltage is brought on the winding of the autotransformer T2 and on the terminal box P3 there is the 115 V voltage necessary for the teletypewriter.

4.4. Mechanic configuration

The services module is contained in a metallic box inserted in the front of the cabinet leaning on a main crosspiece.
The box sizes are :

height : 250 mm
lenght : 310 mm
depth : 170 mm
weight : 15 Kg

4.5. Documentation

For further details it is necessary to refer to the assembly drawing of the VAR 580.

5. CABINET (CON 480/A)

5.1. General

The cabinet has been designed to comply with the GE 100 line appearance requirements. It allows the operator to work standing or seated on a rotating stool which is supplied with the cabinet.

5.2. Composition

It mainly consists of the following parts .
- main structure
- base with wheels and adjustable feets
- 2 standard side panels with ventilation grid
- 1 standard back panel
- 1 750x670 mm front panel
- 1 front shell of the GE130 panel type
- an upper cover consisting of :
  - a) main hood planned to insert the keyboard, panel, reader, punch, tape and paper support;
  - b) small cover which can be opened to insert the paper at operator level
- stool.

5.3. Functions

The cabinet performs two main functions :

1) It serves as a support to the teletypewriter and adjusts its form to the appearance of the GE-100 line, by means of the front cover.

2) It contains the logic of the controller, the service module, the chads drawer and the ALI 290/A.

5.4. Cables passage

It is obtained by means of a special duct located in the front part of the cabinet.

5.5. Sizes

Height = 980 mm
width = 700 mm
base depth= 700 mm
The maximum depth is = 793 mm.

5.6. Weight

170 Kg.

6. VENTILATION GROUP - VAR 640

6.1. General

At the base of the cabinet, just under the logic modules, there is the ventilation group consisting of three fans with related protections.
The fans receive the a.c. voltage from the main system through a special cable.
The assembly of the fans and of the logic modules rotates on a axis fixed at the left extremity of the structure.

6.2. For the electric description, refer to the electric diagram VAR 640 No. 78B102106.

7. MAINS FILTER

The CTW 101 subsystem uses as a mains filter the ALI 290/A already released with code No. 0645810P.

8. CONTROLLER (GIT 100)

8.1. General characteristics

8.1.1. Introduction

The controller of the CTW 101 subsystem allows the connection of the teletypewriter with the systems of the GE-100 line. It is provided with buffer with 256 memory positions and contains the checks which are present to the information exchange.

8.1.2. Compatibility

The controller is compatible with the systems GE 120, GE 130.

8.1.3. Physical configuration

The controller is contained in the cabinet previously described; it uses boards with SCL 1 standard discrete components.
The boards are inserted in SMN type modules.
The logic of the controller occupies a module and a half while another half module is occupied by the MEM 160 memory driving logic.
The rows are called A,B,C,D,E,F.
All the structure of the modules rotates, fans included.

8.1.4. Electric Configuration

8.1.4.1. Logic connections

The controller is connected to the central processor with four NS45 cables having a 6 meters length.

8.1.4.2. D.C. voltages

The controller requires only one d.c. voltage taken from the central power supply of the system to which it is connected.
The voltage value must be +20V ± 5%(with tolerance of ±10% for the margining operations).
The absorption is of 8A with the +20V nominal voltage.

8.2. Commands description

The controller recognizes and checks the performance of the following commands, arrived from central processor.

8.2.1. Commands occupying the controller

	Hexadecimal code
SET INPUT	01
TRANSFER IN INPUT	00
TRANSFER IN OUTPUT	02

8.2.2. Commands which do not occupy the controller

	Hexadecimal code
BREAK	03
SET MANUAL	0C
RESET INTERRUPTION NU10	06
RESET INTERRUPTION NU20	07
ENERGIZE CLOCK	0A
RESET INTERRUPTION FROM CLOCK	05

8.2.3. Specific commands for diagnostic hardware

	Hexadecimal code
SIMULATE STOP	85
SIMULATE START	45
RESET DIAGNOSTICS	25
INHIBIT BUFFER UNLOADING IN OUTPUT	15

8.3. Status information

The controller presents the following signals on the GE 100 interface. They have ,in general ,logic "1" meaning when their level is at "0" volts d.c.

8.3.1. PEOOT - Availability

8.3.1.1. Transfer phase in Input

It shows upon the arrival of "set input" and falls with the end of transfer, i.e. with the filling out of the buffer.
The end of the transfer may occur for one of the following cases :
- X-OFF push-button
- EOT push-button = wrong message
- Overflow

In this phase, in addition, the PEOOT is removed if a BREAK command arrives.
Once the buffer has been filled out, PEOOT shows upon the arrival of the TRANSFER IN INPUT command and it is removed with the end of the transfer.
The unit not available, in this phase, rejects all the commands except the BREAK command.
In addition the unit returns always to be available when the out-of-service condition shows.

8.3.1.2. Phase of transfer in OUTPUT

PEOOT shows with the command of transfer in output and is removed only at the end of the transfer and printing.
In this phase the not available unit rejects all the commands and becomes always available when the causes of out-of-service show.

8.3.2. IGOLT

It is significant only in the INPUT transfer phase and it is used to distinguish the two types of interruption INES, NU30, NU20 which show at the end of the buffer loading and at the end of the printing and transfer in output.
It shows with the command SET INPUT; it is not removed at the end of the buffer filling but upon the arrival of the TRANSFER IN INPUT command.
In the time interval between the end of the buffer filling and the arrival of the transfer in input command, characterized by the presence of IGOLT on the interface and the absence of PEOOT, any command is rejected, unless it is a command of BREAK, TRANSFER IN INPUT, RESET INTERRUPTION NU20.

8.3.3. CAPET - Commands improbability and error

It shows for one of the following reasons :
- Command sent with controller busy except the BREAK command.
- Command sent with controller in manual status
- Command received with wrong odd parity
- Command of input transfer when the buffer is empty, i.e. before a request from the operator and before a command of SET INPUT.
- In the case of buffer full (IGOLT present and PEOOT absent) upon the arrival of any command other then TRANSFER IN INPUT, BREAK, RESET INTERRUPTION NU20.

It falls always at the beginning of the reception of a new command.

8.3.4. ERCAT - Channel Error

It checks the check error on the data and on the commands arriving from CPU.
Should there be a check error on the commands the two indications CAPET and ERCAT show simultaneously on the interface.
It is removed by the arrival of the following command.

8.3.5. SEGET

8.3.5.1. INPUT phase

a) Buffer loading phase from keyboard or tape reader; SEGET shows for the following reasons :

- Pressure of the EOT push-button, to indicate wrong message
- For overflow condition
- For a character outside the allowed set.
  For this reason. we want to point out that the allowed set in INPUT consists of the characters of the graphic set, plus the functions LINE FEED, CARRIAGE RETURN,plus the check function X-OFF, EOT; all the characters not included in the mentioned ones, if present in input,determine the showing of SEGET.
- Because of check error on the characters arriving from teletypewriter.

b) CPU buffer transfer phase

In such a phase SEGET shows because of a check error on the data at the buffer output.

8.3.5.2. Transfer phase in OUTPUT

It shows with :

- Check error at the buffer output and though it is significant only at the end of printing.

8.3.5.3. SEGET is removed by :

- SET INPUT command
- TRANSFER IN OUTPUT command

8.3.6. MARET - OUT-OF-SERVICE

The signal MARET is present in the following conditions :

- when the subsystem is in OFF
- when the chads drawer is full with subsystem available. In such a case, the subsystem goes to the STAND-BY status.

The signal is removed in interface respectively when :

- the ON push-button is pressed
- the chads drawer is not full anymore and the OPERATE push-button is pressed.

8.3.7. SECOT - Subsystem in manual

It shows for :

- all the causes which determine MARE
- when the STAND-BY push-button is pressed on the panel
- when the command of SET MANUAL is sent

The SECOT signal is reset pressing the OPERATE push-button if the causes which have generated it have been eliminated.

8.3.8. INEST Interruption

It shows in all the cases of interruption, i.e. :

- when the operator presses the INPUT push-button, together with NU30 and NU10;
- at the end of the buffer filling in phase of INPUT (X-OFF, EOT, OVERFLOW), with NU30 and NU20;
- at the end of the transfer and printing in OUTPUT phase, together with NU30 and NU20;
- when there is interruption from clock (with NU30, MAPE).

8.3.9. MAPET - Interruption from clock

It serves to indicate the presence of the interruption from clock. It shows with the command of ENERGIZE CLOCK, in any condition the subsystem is.
It is removed with the command of RESET INTERRUPTION FROM CLOCK.

8.3.10. NU30T

It shows every time an interruption shows and serves to software to recognize which is the interrupting subsystem.

8.3.11. NU10T

It serves to specify the interruption of machine request by the operator.

8.3.12. NU20T

It is necessary to distinguish two cases:

a) IGOLT present in such case it specifies the interruption of end of buffer loading in INPUT.

b) IGOLT absent defines the interruption of end of printing in output.

8.3.13. MATET

It is a signal which is exploited in diagnostics

- Through MATET in the printing phase, following a loading from central processor, the characters which generally are sent to the printing unit, are sent back towards the central processor.
- In the loading phase from keyboard, MATET moves according to a well defined sequence, which can be exploited in diagnostics to send the commands SIMULATE STOP and SIMULATE START, and in addition to simulate correctly the serial character sent from CPU, instead that from keyboard.

8.3.14. EGOLT

It signals the condition of OVERFLOW in the controller. Such a signal falls when the OVERFLOW push-button is pressed.

8.3.15. FINET

It shows when :

- the character IS7 (F/I) character is read in the buffer introduced with the check functions X-OFF and EOT;
- automatically when the 255th character is transferred independently from the fact that a check function X-OFF has been introduced.

The FINET signal is removed with the arrival of FINU from CPU or with clear.

8.4. Failures diagnosis

The failures diagnosis uses the special diagnostic programs (No. of

8.5. Alert condition

The ventilation group has been provided with a protection device for no ventilation, whose intervention causes the total switching off of the system.

8.6. Operations theory

8.6.1. Description at general block diagram level

The controller is provided with an interface which connects it to the central processor, one which connects it to memory and one to the service module.
Referring to the logic diagrams, the following blocks may be distinguished :

- interface timing logic
- statuses logic
- commands decoding and storage logic
- errors check logic
- interruption logic
- internal timing logic
- COB 1-4 bit counter logic
- RINO - 8 register logic
- buffer driving logic
- buffer addressing counter logic
- echoplex logic .

8.6.1. Interface timing logic

It includes all the logic networks which generate or check the interface pulses and signals.

8.6.1.2. Statuses logic

It groups mainly the statuses of the subsystem transmitted to the interface of the central processor.
It contains, in addition, the ri-generations of the signals arriving from the panel and the services module.
More in details, it consists of :

- MARE logic
- SECO logic
- IGOL logic
- PEOO logic
- OVERFLOW logic
- almost end of buffer logic
- logic of NU10 set (SENA)

8.6.1.3. Commands storage and decoding logic

It consists of the networks which recognize. check and perform all the commands arriving in a coded form from the Central Processor.

8.6.1.4. Errors check logic

It consists of the networks which identify an anomalous condition and signal their presence to the interface towards central processor and/or simultaneously they switch on the light indications on the subsystem panel.
More specifically, it includes :

- CAPE logic
- SEGE logic

- ERCA logic
- check control logic on data or commands arriving from a central processor (INCE)
- check logic on data coming out from the buffer (CEDO)

8.6.1.5. Interruption logic

It is the assembly of the circuits which take care of the storage of the interruptions (NU10,NU20,MAPE) and provide to send them on the central processor interface.
This chapter contains also the generation of the signals INES and NU30 which accompany always each one of the three interruptions previously mentioned.

8.6.1.6. Internal timing logic

It contains the logic to drive the multivibrator MUTE done through the FF FIMU and the pulses which serve, in the various phases, to the storage and transmission of the information.

8.6.1.7. Bit counter (COB 1-4)

The COB is a serial counter consisting of 4 Flip-Flops which has the task to count the bits referring to every character making possible the storage character by character.
The counting trigger is the pulse T003 generated by the 5th out of the 8 pulses of MUTE related to every bit.

8.6.1.8. MUTE (MUC 1-3) counter

It is a serial counter with 3 F.F.
It serves to count the pulses of MUTE which accompany every bit of character. Through its decodings the pulses are gene-

rated which allow the storage of the bits forming a character.
At the beginning of every bit (i.e. every 8 MUTE) it is cleared and threfore its cycle is coincident in the average with the length of a bit (9.09 ms.).
The counting pulse consists of the MUTE pulse.

8.6.1.9. RINO - 8 register

The RIN register consists of 9 Flip-Flops connected to a shift register. It is used both in the input and output phase.
In input, in which the Flip-Flops RIN 1-8 are interested, it serves to store the characters arriving from teletypewriter and to parallelize them. In the buffer emptying phase it receives the character taken from the memory before the expansion.
In output, where the Flip-Flop RINO -8 are interested, it receives the data arriving from CPU and serializes them suitably sothat they are accepted from the teletypewriter.
The F.F. RINO in input has the function to enable the echoplex.

8.6.1.10. Buffer driving logic

It includes the logic to start the writing and the reading in MEM 160, the positioning logic in memory of the special key IS7 and in addition the networks which realize :

- the writing in buffer of the characters arriving from CPU and reading of the same ones, character by character, so to obtain the prints ;
- writing of the characters arriving from teletypewriter and reading of the same ones, character by character.

8.6.1.11. Memory addresser counter (CIO 1-8)

It is a parallel counter with 8 Flip-Flops which has two specific functions:

- it addresses in sequence the various memory positions with counting pulse (TE02N → COAV) supplied by the internal timing of the buffer, about 0.5 µs before the end of the memory cycle;
- it allows to decount every time the key ← is pressed on the keyboard, so to erase the wrong character. The deccunting is obtained through a first complementing (comp 1) a count + 1 (TA07) and a subsequent complementing (Comp 2.)

8.6.1.12. Echoplex logic

It includes the logic networks which collect on the receiving channel the signals coming out from the transmitting channel of the MIT 410. Such networks allow to perform the printing introducing the messages from keyboard or from tape reader.
The echoplex block, inhibiting the printing from keyboard, replaces the keys interlock, performance, this one, which is not present in the mechanics.
The echoplex is enabled when the machine is in STAND BY or it is available for the CPU; in phase of transfer in OUTPUT, when the buffer is full, it is disabled.
An operator who tries to use the keyboard, with the machine in OPERATE and the INPUT light off (therefore also when it has completely filled the buffer) notices the wrong operation because of the lack of printing.

8.6.2. Description at intermediate block diagram level

8.6.2.1. Introduction

In order to make the controller description clearer, the logic has been divided in five main phases, defined as follows :

1) Phase of operator request
2) Phase of data introduction from MIT 410 to Buffer (INTA phase)
3) Phase of data transfer from Buffer to CPU (VIBU phase)
4) Phase of data transfer from CPU to Buffer (TACA phase)
5) Phase of data transfer from Buffer to MIT 410 (USBA phase)

Before examining the various phases we will explain the commands, their storage logic and the checks to be applied on them.

8.6.2.2. Commands storage logic

The commands storage occurs according to the following sequence :
reception of the PU00 channel selection signal,
reception of the TU20 accompanying the command code.
On the leading edge of TU20 the one-shot circuit TURI starts which introduces a delay of 2 μs, suitable to guarantee the decodings storage. When TURI falls, the one-shot circuit TU02 starts for 1.2 μs. which represents the effective TU20 delayed. TU02 in presence of VICUT, i.e. with command codes in interface, generates TECON which is the TU20 specialized for the commands.
The purpose of the logic previously described is mainly to divide the strobe (TU20T) related to the commands from the one related to data, beside to regenerate the strobe itself arriving from cable and to introduce delays sufficient for a perfect storage of information.
The command then, before being accepted, undergoes a series of checks as it will be specified in para. 8.6.2.4.; only if the check is considered as being correct, the command may be stored. For this reason, the TECON pulse is conditioned by

INCO and only when INCO is absent INTEN shows which is the storage strobe.
Due to some internal timigs it has been necessary to have available also a commands strobe anticipated with respect to INTEN. This strobe is REER, which is simultaneous to TU2OT unless some stage delays.

8.6.2.3. Commands description

The commands are divided in two main categories :

a) commands occupying the channel
b) commands not occupying the channel

8.6.2.3.1. Commands occupying the channel

They are 3 and in particular :

1) SET INPUT
2) TRANSFER IN INPUT
3) TRANSFER IN OUTPUT

8.6.2.3.1.1. Command of SET INPUT

This command serves to make the machine available to the operator once he has asked for it pressing the INPUT push-button.
The decoding of such command, MAOP, strobed by INTEN sets the FF INTA which stores the command itself and therefore the data introduction phase.
In addition, upon the arrival of the command, the subsystem is occupied, PEOOT shows, the FF IGOL is set, the INPUT signal is lit on the panel and the echoplex network is enabled.

8.6.2.3.1.2. Command of TRANSFER IN INPUT

Such command enables the unloading of the buffer towards CPU, once the condition of buffer full has occurred.
The decoding of the command of TRANSFER IN INPUT is DEVU; timed by INTE it sets the FF VUBU which stays set until the transfer phase is over.
Naturally the command occupies the unit making PEOOT show and removes the signal IGOLT.

8.6.2.3.1.3. Command of TRANSFER IN OUTPUT

It has the function to enable the transfer of information from CPU to MIT 410. Its decoding is DETA which, always strobed by INTE, sets the FF TACA, storing the command only in the data transfer phase from CPU to MEM 160.

Once such a phase is over, the FF TACA is reset and its information related to the command of TRANSFER IN OUTPUT is automatically transferred to the FF USBA which has the purpose to detect the printing phase.

The arrival of the command, as for the two previous ones, occupies the unit until the end of the subsequent transfer.

8.6.2.3.2. Commands not occupying the channel

Generally, the storing circuit of such commands follows the chain examined in para. 8.6.2.2.; should it not be followed, it will be specified during the description of the single commands.

8.6.2.3.2.1. Command of BREAK (Reset Input)

It serves to take away the machine from the operator.
It may therefore be accepted during the phase of data introduction from MIT 410 and also when the buffer, filled from

keyboard, is ready to be emptied with the command of TRANSFER IN INPUT.
Its decoding BRAE, timed by INTEN, generates COBE.
Upon the arrival of this command, during data introduction phase, the FF INTA is reset, the echoplex is disabled and the INPUT light on the panel goes off.
Therefore, it is not possible to introduce any more information in the buffer and the data already present in MEM 160 are annulled.

If the BREAK command arrives when the buffer is full, the buffer contents is annulled.
During the phase of the subsequent printing and a TRANSFER IN OUTPUT, such command may be accepted as at the end of the printing the subsystem is already available to the CPU.
The command must be sent without waiting for unit available.

8.6.2.3.2.2. Command of SET MANUAL

COMA, the strobed decoding of the command of SET MANUAL sets the FF STAN which stores it.
It serves to set the subsystem in the STAND BY status i.e. OFF-LINE.
The FF STAN stores the command, making it, though, efficient only at the end of the phase under way.

8.6.2.3.2.3. Commands of interruption reset

They are 3 commands which serve to reset the three interruption conditions, NU1OT,NU2OT,MAPET.

. The decoding of the reset command NU1O is RAION and together with INTEN it determines the reset of the FF NA1O, making NU1OT come down to logic level "0".
The command must be sent before the SET INPUT command.
Such limit has been imposed in order to avoid the presence of NU1OT at the end of the buffer loading together with NU2OT.
It is the task of software to comply with such a limit.

- The decoding of the reset command NU20 is RE20,always timed by INTE, it resets the FF NA20, bringing NU20T at logic level "0".
  In the phase subsequent to the one of data introduction from MIT such command must be sent before the one of TRANSFER IN INPUT in order to avoid to have a signal of NU20T once the transfer towards CPU is over.
  It is the task of software to comply with such a limit.
- The command of interruption reset MAPET deriving from clock, may be sent in any moment.
  Such command does not undergo any check and has as strobe TECON and its decoder is RESIN.
  With its presence, it resets the FF MAPE bringing immediately MAPET at logic level "0".

8.6.2.3.2.4. Command to start the clock device

The clock device is a timer which at a fixed time (20ms) makes the interruption MATET show.
The command decoding which triggers such a device is ATTIN; it does not undergo any check and it is therefore timed by TECON; it is stored in the FF ADIS.
ADISN, when it goes to "0" Vdc starts the chain of one-shot circuits UNA1 and UNA2 set in cascade and serves at the same time to enable the set of the FF MAPE whose strobe is given by the trailing edge of UNA2.

8.6.2.3.2.5. Command to stop the clock device

The decoding of such a command, RESIN, always strobed by TECON, for the reason given previously, resets the FF ADIS disabling the set of MAPE with the trailing edge of UNA2.

8.6.2.3.3. Commands for diagnostic hardware

8.6.2.3.3.1. Command of simulate STOP

This command serves to simulate the stop in the construction of the serial character created by CPU instead of the one generated from keyboard, in the phase of data intro - duction from MIT.
Its decoding PAMU resets directly the FF TEIN.
TEINN generated TELA simulating in this way the character stop.
In the data transfer phase in output,instead, it serves to cause on inversion of the check on the commands arriving from CPU (MUFUN).

8.6.2.3.3.2. Command of simulate START

Such a command, in the phase of data introduction from key board, has the function to simulate the characters START .
Its decoding SIST sets directly the FF of TEIN, creating as in the previous case, a simulated START.

8.6.2.3.3.3. Command of diagnostic reset

Its decoding, timed by TECON, resets all the FF of the controller and the diagnostics conditions.

8.6.2.3.3.4. Command of inhibit unloading of buffer in OUTPUT

This command inhibits the printing phase consequent to a transfer from central processor and sets the controller in the conditions to accept and perform a command of transfer

in input.
Its decoding SINU, strobed by TECON, sets the FF INUS.
When INUS is at "+5Vdc" it removes the permission from the generator of pulses RITE therefore the FF USBA is not anymore set by the arrival of the negative edge of FIRI.
At the same time FIRIN and INUSN make INFI raise at +5 Vdc.
INFI sets the FF IGOL and resets the FF PEOO; in this way the subsystem is in the conditions of buffer full for loading of data from keyboard and may accept and perform the command of TRANSFER IN INPUT.

8.6.2.4. Logic of command reject

All the command reject logic is based on the FF CAPE. Such FF is set if, upon the arrival of the TICAN pulse, INCON is at OVdc. TICAN is a pulse which copies TECON in the cases of all the commands except those related to the clock device. It may, so, be understood what has been said previously, i.e.that the start and stop commands of the clock device and of interruption reset from clock do not undergo any checks.

The command is rejected when INCON is at OVdc.
Let us examine the causes.

- Check error on the commands (INCE)
- Command reception with subsystem in manual (RISE)
- Reception of a command to empty the buffer, DEVU, in absence of PEOO and IGOL (DIRI). This check avoids that, after a program loading phase, a buffer unloading phase is accomplished without before having introduced the characters in the buffer itself.
- Reception of any command, except BREAK, during the phase of data introduction from MIT (RIBI).
- Reception of any command, other than BREAK, interruption reset NU20 and TRANSFER IN INPUT, when the buffer is full (RIDI).
  As it will be seen in the following paragraphs the condition of buffer full is: FF IGOL set and subsystem not busy.

- Reception of any command with subsystem busy in all the phases other than those of data introduction from MIT.

The signal INCON disables the strobe of the commands INTEN and sets the FF CAPE, therefore the signal CAPET indicates to CPU an error on the commands.
The FF CAPE is reset by the following command (REERN).

8.6.2.5. Phase of REQUEST FROM OPERATOR

To request for the machine, the operator must accomplish a series of operations which have, as aim, to make the interruption mechanism towards CPU trigger.
The correct sequence is the following :

- Press ON
  + 20 dc arrives and the A.C. voltage is brought to the MIT, the STAND BY light turns on and the subsystem is in manual.
- Press OPERATE.
  The subsystem goes in automatic
- Press INPUT
  INPUS, arriving from panel, goes to 0Vdc and, for the intrinsic constitution of the ICRE's, INPU goes to +5Vdc.
  The FF DEIN is set whose output disables the oneshot circuit SENA.
  When the INPUT push-button is released, INPU goes to 0vdc, in addition RIPU raises which resets the FF DEIN whose coming out makes the SENA pulse start which sets the FF NA1Q
  In the conditions in which the AND has been operated ECOIC is enabled, therefore, on the interface NU1OT is at 0 Vdc and therefore it is significant.
  Automatically, NU3OT and INEST become significant.
  The CPU receives the interruption request information through NU3OT and it is specified that the interruption is the one requested by the operator through NU1OT.
  The interruption shows only when releasing the INPUT push-button in order to avoid that, if the CPU serves the interruption when INPUT is still present, an anomalous situation shows at the end of TRANSFER IN INPUT.

Let's now examine some logic implications :

- If the operator presses INPUT with the machine in STAND BY, such operation is stored in the FF NA10,a NU10T will be significant only at the passage of the subsystem to automatic.
- If INPUT is pressed during the phase of TRANSFER IN OUTPUT, NU10T interruption shows, but it is delayed up to the moment in which the subsystem becomes available and it overlaps the end of printing interruption.
- Finally, if INPUT is pressed during the phase of data introduction to MIT or in condition of buffer full, NU10T is significant only at the end of the TRANSFER IN INPUT.

8.6.2.6. Phase of data introduction from MIT 410 (TTY) to buffer (INTA phase)

After the request from operator, the CPU serves the interruption, which has shown up as seen in the previous chapter, sending the command of SET INPUT.
The FF INTA is set, the subsystem becomes busy and the INPUT light on panel turns on.
This means that the operator only from now onward may start to introduce data from TTY.
The SET INPUT command in addition sets the FF IGOL.

The direct output from the FF INTA, inverted, enables the echoplex (RANI) so that the characters transmitted are also printed by the MIT.
When the operator starts to introduce data from TTY,the internal timing logic-triggers.
Let's, first of all, see what happens when a character of the graphic set is introduced, while further on we will specify the special cases.

8.6.2.6.1. Introduction of a character belonging to the graphic set

As it has already been said in chapter 2.3.1. the signal arriving from TTY related to a character consists of 7+1 bits which specify its code, of a START bit and of two STOP bits.
Every bit has a nominal period of 9.09 ms.with a tolerance of ± 409 µsec.
The signals arriving from MIT (TELES) are filtered through an ICRE, rigenerated and set both on the transmitting and on the receiving channel : TELE 1 is sent to the echoplex network and then brought back to the printing circuits of the TTY itself, while TELEN and therefore TELA are brought to the controller.
The information related to a character arrives serially from TTY, it is parallelized in the RIN 1-8 register and then transmitted to buffer.
The Clock pulses for RIN 1-8 are created activating,upon the arrival of every character, a multivibrator which,for the whole period in which it stays activated,generates some pulses always at the same frequency.
The frequency has been chosen so that the time interval lasting for a bit is covered exactly by eight pulses.
There is, consequently, a pulse counter which serves to discriminate the pulses belonging to the different bits and a counter which evolves every time a bit is stored.
Let's now see more in details how a character is introduced in the buffer.
With the first edge (negative) of the START bit,through TELA, the FF FIMU is set (DETE). The purpose of FIMU is to enable the multivibrator MUTE. The arrival of DETE in addition, enables the pulse AVMU which serves to reset the counters MUC 1-3 and COB 1-4.
MUTE stays enabled for all the time in which FIMUN is at 0 Vdc.
The multivibrator MUTE issues pulses with an amplitude of 1.2 - 1.4 µs. with a frequency of 1.14ms. from the enabling.
The pulses chain MUTE, which becomes MUINN in the INTA phase,

has the purpose to supply the pulses to time the various sequences of operation. The pulses MUTE are counted by the counter MUC 1-3 which clears automatically every eight counts.
According to what has been said previously every 8 MUTE, the controller receives a subsequent character bit.
Every character bit is stored in the RIN 1 - 8 register connected to a shift register.
Considering the tolerances imposed by the TELETYPE the bit sampling occurs in the central area of the bit itself, in correspondence of the arrival of the 4th MUTE. With the 4th MUTE TIOIN shows which is the clock for the register RIN 1-8 and therefore the START bit is stored at the arrival of the 4th MUTE in the FF RIN 8.
Now it is necessary to store that the START bit has been stored; this is obtained with the 5th MUTE which through TOO3N makes the counter COB 1-4 move forward of one step
At the arrival of the 8th MUTE the counter MUC 1-3 goes back to the initial condition.
The START bit is so finished and with RIN 8 the bit following the START will begin to arrive, i.e. the first character significant bit.

With TIOIN the bit itself is stored in RIN 8, while the START bit is transferred in the FF RIN 7.
With the 5th MUTE the COB 1-4 counter moves forward and it goes to two counts.

The character bits following the first one are stored with the same sequence.
When also the 8th bit, last significant character bit before the two stop bit, has been stored, the situation is the following one :
RIN 1-8 stores respectively the 7+1 significant bits of the received character and the bit counter has counted 9.
The MUTE continue to arrive but do not act on RIN 1-8 as TIOIN is inhibited when the bit counter has counted 9 (DE09) or 10 (DE10), while they act on the MUC 1-3 and COB 1-4 counter.
With the 8th MUTE related to the first STOP bit the pulse FITE shows, which indicates the character end.
FITE resets the FF of FIMU and the multivibrator MUTE is disabled.

The character so stored in the register RIN 1-8 must be recorded in the buffer.
I want to point out that in order to record in memory a character, it is necessary before to transfer the character in the register MEO 1-08 in MEM160 and then to start the memory timing.
At the arrival of FITE, through REMUN and MUNO, the TEOO pulse starts which serves to accomplish the two operations mentioned above.
In fact, with the first edge of TEOO through TEOAN and TISIN the bit transfer is enabled from RIN 1-8,while on the second edge of TEOO (TEOM) the internal memory timing necessary to record a character in the buffer is started.

RIN 1 N	(AIBI)	ME01
RIN 2 N	(BIBI)	ME02
RIN 3 N	(CIBI)	ME03
RIN 4 N	(DIBI)	ME04
RIN 5 N	(EIBI)	ME05
RIN 6 N	(GIBI)	ME06
RIN 7 N	(LIBI)	ME07
RIN 8	(MIBI)	ME08

The memory cycle lasts for about 4 μs.
After about 2 μs the pulse TE02N, which positions the memory addresser counter CIO 1-8 on the following address , is issued from memory.

In the transfer RIN 1-8 to MEM 160 the character check is inverted (RIN 8 and not RIN 8 N gives MIBI) therefore in memory there is an odd parity check in order to be in condition to recognize malfunctions of the memory itself.
Upon the arrival of the start bit of the subsequent character the multivibrator MUTE starts again and therefore the sequence previously described is repeated.

8.6.2.6.2. Introduction of the end of message character (X-OFF)

The operator, in order to signal that he has finished the message must press the X-OFF push-button together with the CTRL key.
The bits characterizing X-OFF are introduced in the register RIN 1-8 following the normal path of every character.
When the X-OFF code is stored in RIN 1-8, FITA shows (decoding of X-OFF) and consequently ORPA goes to +5 Vdc.
The MUTE pulses continue always to arrive, but FITE does not show, strobe of end of character, disabled by ORPA.
At the end of the second STOP bit, i.e. when there is DE11, with the arrival of the 8th MUTE, FITO, strobe of end of message, shows.
With FITO the FF FIMU is reset, as the multivibrator MUTE is disabled and at the same time the FF INTA is reset, the INPUT light on panel goes off signaling to the operator that he cannot introduce any more characters.
The subsystem becomes free.
The code of X-OFF is never introduced in the buffer, but , instead, the special key IS7 is introduced in the following way :
FITO makes the pulse TE00 start, which, being ORPA present, no more generates TISI but it generates FUSI which, through VITU, forces in MEO 1 - 05 the code of IS7 .
With the negative edge of TE00N, the memory timing starts, therefore IS7 is introduced in buffer.

The subsystem in addition must signal to CPU that the loading from MIT is over, i.e. it must signal NU2OT, NU3OT, INEST.
This is obtained always through the strobe FITO which sets the FF NA2O making the NU2OT show and, automatically, NU3OT and INEST.
Now the subsystem is in the condition of buffer full defined by the presence on the interface of IOOLT.
This signal allows to distinguish the interruption for the end of buffer loading from the one, always signaled by NU2OT, of end of printing in OUTPUT.

8.6.2.6.3. Introduction of a wrong end of message character (EOT)

Should the operator realize to have introduced a wrong message or part of message, it may annul it pressing the EOT push-button associated to the CTRL key.
The decoding of EOT, EINT makes ORPA show and then FITO of end of message signaling the end of buffer filling and, as for the previous case, it forces IS7 in memory making then show the interruption INEST, NU3OT, NU2OT.
In addition EOT is a character outside the graphic set, therefore CERIN goes to 0 Vdc and CAPU goes to +5 Vdc.
With the arrival of the pulse TIO3N, which starts with the 6th MUTE of the last significant bit, the FF SEGE is set and the signal SEGET shows on interface.
In this way, an indication that an error has occurred in the message is sent to CPU.
It will then be the Software choice to use the buffer contents or letting the wrong message go.

8.6.2.6.4. Characters erasing logic

Should the operator want to annul one or more subsequent characters, he must press the "←" push-button once or as many times as the characters to be annulled.
There are some limits :

- If the operator presses "←" exceeding the number of the characters introduced, overflow shows.
- The 255th introduced character cannot be annulled. Also in this case, the trial generates overflow.

All the character erasing logic has the purpose to update the memory address counter to the position of the character to be annulled. Evidently, it is annulled by re-writing in memory the correct character.
Let's how see more in details the logic :
pressing the push-button "←" RIN 1-8 stores the related code. When the storage has been completed, DELE shows and if the FF INDE is not set, DILE goes to +5 Vdc.
The F.F. INDE takes into account the following conditions:

memory counter = 255
memory counter = 0

If the FF INDE is set all the character erasing is disabled. Assuming, therefore, of not being in one of the two particular cases, upon the arrival of the FITE related to the character "←", the FF FIMU is reset, therefore the multivibrator MUTE stops ; in addition, as the TE00 pulse start is not enabled the character "←" does not enter the buffer. The counter CIO 1-8, on the other end, is stopped on the position competing to the character "←", therefore, if the character preceding "←" is to be annulled, it is necessary to update CIO 1-8, i.e. to make it decount.
This is obtained through a first complementing, as it is well know.
The first complementing occurs with TI03N (COM 1), the count + 1 occurs with the subsequent MUTE pulse (TA07) and finally the second complementing (COM 2) shows with the FITE of the character "←".
Now the CIO 1-8 counter stores in the buffer the position of the character to be erased. Pressing the correct character, the correction occurs automatically.
In order to annul several subsequent characters it is enough to press for a suitable number of times the push-button "←" and to introduce the correct characters.

8.6.2.6.5. Overflow logic

It is all based on the FF OVER; let's now examine the causes of set :

1. Should the operator after the last character (the 254th) not press X-OFF or EOT, but another character the interruption of buffer end of loading is sent automatically, but accompanied by the signals SEGET, EGOLT and by the turning on of the lights of OVERFLOW and SEGE on the panel, while the echoplex is disabled. In fact, introducing a character other than X-OFF or EOT when DE 25N is at 0 Vdc, SOVE shows which sets the FF OVER determining the switching on of the overflow lamp (OVERL), the showing of the EGOLT signal and the disabling of the echo-

plex.
In addition, with DE25N and INDEN at 0 Vdc. the arrival of character other than X-OFF determines through FIDE the set of SEGE and the switching on of the SEGE lamp.
FIDE itself then enables ORPA and then all the sequence of buffer end of loading.
Also the "←" is included in all the characters other than X-OFF and EOT.

2. Should the operator, as seen in the previous chapter, want to press the character "←" when CIO 1-8 is at zero, i.e. he wants to annul more characters than those who have been introduced, SIVE goes to + 5 Vdc. setting the FF OVER.
   SIVE itself makes SEGET show through COAN.
   The signal of buffer end of loading is given automatically as in these conditions ORPA shows as PAME is enabled.

   In order to annul the overflow conditions it is necessary to press the special OVERFLOW push-button on the panel: TOVES causes directly the reset of OVERFLOW.

8.6.2.6.6. Introduction of a character outside the allowed set

If a character outside the allowed set is introduced from MIT, it does not enter the buffer and generates the signal of SEGET.
For every character outside the graphic set CERIN goes to 0 Vdc. If it is a character other than LINE FEED, CARRIAGE RETURN, X-OFF CAPU shows and the FF of SEGE is set. Therefore all the characters outside the allowed set make SEGE show.
As it is a character outside the allowed set NOTI goes to 0 Vdc. and it therefore disables the starting of TEDO being TEVIN at +5 Vdc.
The character therefore is not transferred in buffer and the multivibrator MUTE is disabled with the FITE of the same character.

8.6.2.6.7. Introduction of the codes of CARRIAGE RETURN and LINE FEED

The codes in these two functions do not belong to the graphic set therefore CERIN is significant.
At the same time, though, they belong to the allowed set, therefore SEGE does not show being CAPU invalidated by the decodings DELI and DERE, of line feed and carriage return.
These codes, though, do not enter in the MEM 160, as NOTI is at 0 Vdc and TEOO is disabled.
Concluding, therefore, the line feed and return carriage characters perform the functions associated to them, being the echoplex path enabled, but do not enter in the buffer and therefore do not occupy effective positions in the message.

8.6.2.6.8. RIN 0 logic

In the data introduction phase from MIT, RIN 0 do not serve as bit storage register, but has mainly the function to enable the echoplex during all the phase.
In fact, RIN 0 is set by the setting of the FF INTA, RINON is at 0 Vdc therefore the echoplex is enabled.
It is reset instead with the TEOAN related to the 254th character avoiding in this way that if, after the 254th character, by mistake, a push-button other than X-OFF is pressed, it is printed altering the contents of the visual information for the operator.

8.6.2.6.9. Error check on data introduced from MIT

In this case the check occurs on the data at the output of RIN 1-8; the parity check is controlled, i.e. the check inversion occuring in buffer is not considered.

If CEDO goes to 0 Vdc, it means that there is a check error on data.
At the arrival of the pulse TE02A from memory, TICE goes to +5 Vdc and consequently the FF SEGE is set with indication

of SEGET on interface.

8.6.2.6.10. Buffer full condition

With any event, which determines the message end the subsystem becomes free while the indication IGOLT on interface remains.
Therefore when PEOOT is absent and IGOLT present, there are the conditions of buffer full.
Simultaneously, the interruption INEST, NU3OT, NU2OT shows.
During the time interval in which the buffer is full, it is the software task not to send commands other than BREAK, TRANSFER IN INPUT, ENERGIZE AND DE-ENERGIZE CLOCK, RESET INTERRUPTION NU20.
It is always the software task to send this last command before sending the one of TRANSFER IN INPUT, otherwise the NU2OT interruption cannot be reset except at the end of the TRANSFER IN INPUT generating an anomalous interruption.

The possible sending of the wrong command, when the buffer is full, makes the signal CAPET show on the interface and the command is rejected.

8.6.2.7. Phase of data transfer from buffer to CPU (VUBU phase)

8.6.2.7.1. Foreword

Referring to specifications SPS No. 30074030, we will describibed as the MEM 160 has been used in the CTW 101.

First of all,, we must note that plans have not been made to use the possibility of reading with recycle as it is a characteristic of the controller to read a character step-by-step.

For this reason, the signal CORI will have to be at +5 Vdc. for a time sufficient to supply the strobe (LETA) to the reading pre-amplifiers and then will have to go down at 0 Vdc.

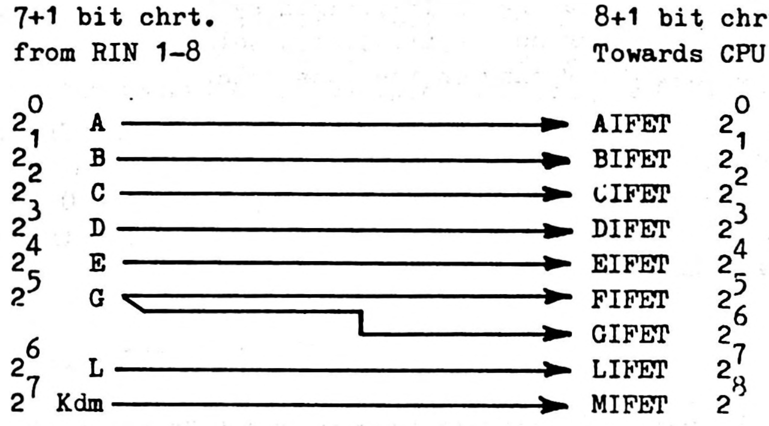
in order to avoid the recycle upon the arrival of the internal pulse TE 031.
The strobe LETA is generated by the LOBE circuit.
The circuit characteristics are such that it is activated only if upon the arrival of TESO, CORIN is already at 0 Vdc as a minimum since 20-30 ns.
The strobe TESO on the other hand, generated by the circuit MOBE, does not show before 500 ns. from the arrival of the negative edge of TEOOM.
In the controller CORI is activated with the first edge of TEOO obtaining a time more than sufficient between the first edge of CORI and the one of TESO.
In order then to avoid the recycle, the FF CORI is reset with the first edge of TE 02N which arrives, in the worst case, after 2115 ns from the second edge of TEOO.
As, in the worst case, TE 031 arrives after 3730 ns from the negative edge of TEOO, the disabling time for the SILE 1 one-shot circuit is more than sufficiently maintained and consequently the recycle is not enabled.

8.6.2.7.2. Once the buffer end of loading interruption has shown, the CPU serves it sending the TRANSFER IN INPUT command whose decoding, with the suitable timing already seen in para . 8.6.2.3.1.2. sets the FF VUBU, which remains in this status during the transfer phase.
At the same time, the subsystem becomes busy, PEOOT goes to +5 Vdc and the signal IGOLT is removed from the interface.
The characters contained in the buffer are automatically transferred to the RIN 1-8 register, and in subsequent times, after expansion, sent to the interface.
Now let's see more in details the logic.
Upon the sending of the command of TRANSFER IN INPUT (SEVU) the register RIN 1-8, through RERI, and the memory addresser counter CIO 1-08 through ORSE, are reset.
The subsystem answers to the TU20 accompanying the command, after a suitable delay with the TE30T of character received.
The delay is inserted so to guarantee a perfect timing of the commands themselves.

The CPU, upon the reception of the TE30 sends the character request TU10T which makes the TE00 pulse start.
On the first edge of TE00 the FF CORI is set which enables the reading timing. With the strobe LETA, the character is stored in the memory register MEO 1-08 and with the first edge of TIBUN the contents of the register MEO 1-08 is transferred in RIN 1-8 directly through the signals MER 1-8.
The direct outputs of the RIN 1-8 register supply the signals AIFET - MIFET towards CPU.
The strobe TE20T is generated by the second edge of TE021, i.e. pratically, at the end of the memory cycle.
Upon the arrival of TU30T of character received from CPU, the register RIN 1-8 is reset, through VUTO, becoming thus ready to receive another character at the arrival of the subsequent TU10T.

8.6.2.7.3. Logic of expansion and check generation towards CPU.

The rule of expansion from 7+1 to 8+1 bit is the one contained in the table below.



MIFET represents the odd parity check of the data towards CPU, after the expansion.
Being the check of the data contained in memory with odd parity, in order to have the same odd parity check for the data towards CPU, it is natural that, every time the bit

2^5 in RING is at "logic 1", MIFET must be inverted with respect to Kdm contained in RIN 8.

8.6.2.7.4. Check control

As in the case of introduction of data from MIT 410 in buffer, the check control occurs timing the information CEDO with TEO2A.
If there is an error the FF SEGE is set,SEGET shows on the interface and the special lamp is lit on panel.

8.6.2.7.4. Sequence of FINE (End) from controller

FINE (End) from controller shows in the phase of TRANSFER IN INPUT, when the code of IS7 has been recognized in output from MEM 160.
In fact the decoding of IS7, timed by TIBUA, determines the pulse TIPA which on its first edge sets the FF FINE, making the signal FINET show on the interface.

The CPU answers sending TU3OT and therefore FINUT accompanied by TU2OT and VICUT. Subsequently REVU goes down to 0 Vdc re - setting the FF VIBU and, indirectly, the FF PEOO 1.
The phase of TRANSFER IN INPUT is so ended and the subsystem is available.

8.6.2.8. Phase of transfer from CPU to MEM 160

In this phase, the information arriving from CPU are transferred directly in MEM 160 without passing through the register RIN 1-8 of intermediate storage.
The data arriving from CPU are coded in 8+1 bit, while the MEM 160 plans only for 8 planes, therefore a compression has become necessary.

Now let's see more in details the logic related to the transfer.

If the light of INPUT on the panel is off, the subsystem is not available to the operator and may work only as output device.

The decoding of the command of TRANSFER IN OUTPUT (DETA) sent from CPU, with INTEN sets the FF TACA and at the same time the subsystem becomes busy being FF PE001 set.

The subsystem sends the TE30T of character received, on whose second edge, through VITE, the strobe of character request TE10T is enabled.

Now the CPU begins to send data validating them with the strobe TU20T.

With the first edge of TU02N (TU20T of character delayed)the strobe TE00 of MEM 160 start is enabled through VIME and,simultaneously, through TISON, the character arriving from CPU is transferred in the register ME01 -08 in MEM 160.

With the second edge of TE00, the internal timing of the buffer starts and the character stored in MEM01-08 is introduced in memory.
At the end of the digit period, MEM 160 sends the pulse TE02N whose first edge enables the TE30T of character received while the second edge positions the counter CI01 -08 at the following address.

The controller asks for another character through TE10T and the previous sequence is repeated.

8.6.2.8.1. End of transfer

The transfer of the message from central processor may end upon end of length and/or end from controller for buffer filling.
Software may determine which is the present condition according to the qualitative result and to the residual address, which occur in CPU.

8.6.2.8.1.1. End of transfer from CPU

When the CPU decides to end the transfer, it sends FINUT with the pulse TU2OT.
With the first edge of TU2OT itself the FF TACA is reset and subsequently FIRI goes to +5 Vdc.

In these conditions in MEM 160 the special key "IS7" is recorded, which will allow to recognize the end of printing in the following phase.

In fact, with the presence of FINUT the pulse TISON is enabled which served to accomplish the transfer of bits from RIN 1-8 ME01-08, while, always on the first edge of TU2ON, the pulse VITO is enabled, which has just the purpose to transfer in MEO 1-08 the code of IS7, through VITU.

On the first edge of TUO2N also the pulse TEOO starts which serves to start off the buffer timing and the TE3OT of character received.
At the end of the digit period, i.e. when the IS7 code has already been recorded in MEM 160, the pulse TEO2N arrives, from buffer.
Being the FF TACA in condition of reset, the subsystem sends no more the character request TE1OT.

On the second edge of TEO2N, the FF FIRI is reset and the pulse RITE shows which sets the FF USBA automatically starting the transfer towards the printing of the data contained in MEM 160 as we will see in para. 8.6.2.9.

8.6.2.8.1.2. End of transfer from controller

The controller signals automatically FINE (end) upon the reception of the 254th character.

In fact upon the arrival of the TISON related to the 254th character, the FF FINE is set and the FINE signal shows on the interface towards CPU.

The 254th character is introduced in MEM 160 and the pulses of TE3OT and TE1OT are still activated.

For the CPU interface characteristics, it answers sending FINUT, therefore, as seen in the previous paragraph, in the 255th position of MEM 160 the IS7 code is recorded and the phase USBA is reached.

8.6.2.8.2. Compression and check generation rule

The rule of the compression from 8+1 bit to 7+1 is the one given in the table.

Character with 8+1 bit from CPU	Character with 7+1 bit to MEM 160
AIFUT	AIBO
BIFUT	BIBO
CIFUT	CIBO
DIFUT	DIBO
EIFUT	EIBO
FIFUT	GIBO
GIFUT	
LIFUT	LIBO
MIFUT (MUFUN)	MIBO

As far as the check is concerned, MIFUT represents the odd parity check of the data arriving from CPU.

MUFUN is equal to MIFUT in normal conditions, while in diagnostic conditions it may be equal to $\overline{\text{MIFUT}}$ when the check is to be inverted.
MIBO, which represents the odd parity check of the data previous to compression, enters MEM 160.
Naturally, if GIFUT is at 0 Vdc, MIBO is equal to MIFUT, while if GIFUT is at 1 Vdc, MIBO is the inverse of MIFUT from which comes the reason of the logic network of the equation:

$$\text{MUFI} = \text{GIFUT} \; (+) \; \text{MUFUN}$$

8.6.2.8.3. Check control on the data arriving from CPU

Should there be a check error on the data or commands arriving from CPU, INCE goes to +5 Vdc.

On the first edge TUO2N the FF ERCA is set and the signal ERCAT is generated on the interface, detecting a certain type of error.

The FF of ERCA is reset upon the arrival of the subsequent command.

8.6.2.8.4. Characters outside the graphic set

If the message sent from CPU contains characters outside the allowed graphic set, no error signal is given and the additional characters are handled in an undetermined way.

Differently from what occurs in the INTA phase, the characters of CARRIAGE RETURN and LINE FEED belong effectively to the message and therefore they must be suitably arranged from SOFTWARE : they concur to determine the length of the message.

It must be pointed out that for correct mechanic operation the operating sequence must be : CARRIAGE RETURN, LINE FEED.

8.6.2.9. Phase of transfer from buffer to MIT 410

In this phase, the data are transmitted in parallel from MEM 160 to the register RIN 1-8 and then serialized, by a suitable timing and sent in this way towards the teletypewriter.

The timing which serves for the serialization is obtained exploiting the pulses generated by the multivibrator MUTE.

The correct structure of the character towards MIT 410(i.e.the START bit, the 7+1 significant bits and the two STOP bits) is created exploiting the FF RINO and through the FF RINO itself the bits come out towards the teletypewriter rigenerated, as per the INTA phase, by the INGE circuit.

8.6.2.9.1. Transfer of a character belonging to the allowed set

The printing phase starts with the arrival of the pulse RITE, generated at the end of the transfer in buffer,chapt.8.6.2.8.1.1., which sets the FF USBA and simultaneously, through RERI, it sets in the reset status the register RIN 1-8 and through OR SE it clears the counter CI01 - 08.

The subsystem continues to be not available.

With the second edge of the RITE pulse the TEOOM pulse to starts the memory is enabled, while CORI is already at +5 Vdc.

The pulse TU04 is so disabled by DE09 and therefore also TUTIN, while with the eighth MUTE TU01 always shows, which with DE09 it sets the FF RINO through TUDE.

Towards MIT, therefore, a signal at +5 Vdc. is sent, which represents the STOP.

In fact, because of the mechanic structure, every character must be accompanied by two final STOP bits.

RINO will, therefore, have to remain set for 18.18 mS,i.e. for two complete cycles of pulses MUTE, time in which the counter COB 1-4 has counted 11 and DE11 is at +5 Vdc.

In these conditions, at the arrival of the eleventh TU01 FUTE shows, pulse of end of character transmission.

With FUTE the register RIN 1-8 is reset and another cycle of read-write and subsequent transfer starts.

Let's note that with such a transfer the printing occurs at the maximum speed allowed by the MIT i.e. 10 chrt/sec.

8.6.2.9.2. End of transfer from buffer to MIT 410 (END OF PRINTING)

When the IS7 function code is transferred in RIN 1-8, the pulse TIPA shows.

"IS7" has the function of special key and stores the condition of last character of the message, character which on the other hand must not be sent to the printing circuits. TIPA, in normal conditions, generates MUBE which, resetting the FF FIMU, has the purpose to interrupt the internal timing.

RINO stays in condition of set signaling to the teletypewriter that no other character has been sent.

The FF USBA is reset on the second edge of TIPA and consequently the subsystem becomes available and in addition it signals interruption NU2OT,INEST, TU3OT towards CPU.

The interruption shows as the FF NA20 is set by TEFU, i.e.by TIPA, therefore NU2OT shows and automatically NU3OT and INEST.

The software may distinguish this interruption from the one of end of buffer loading in INPUT, making reference to the status of the signal IGOLT.

8.6.2.9.3. Check and inversion control

The parity check control occurs on the data, also in this case, by the CEDO network while the inversion occurs in the transfer from the register MEO 1-08 to the register RIN 1-8.

A possible check error makes the signal SEGET show on the interface and the SEGE lamp is lit on the panel.

8.7. Transfer speed

The data transfer speed varies depending on the phases in which the subsystem is.
Being the transmission asynchronous, the maximum speed values are fixed.

- Buffer loading phase from MIT 410
  The limit speed is the maximum allowed by the keyboard or reader: it is off 10 chrts/sec. i.e. 110 bits/sec = 110 bands.
- Buffer emptying phase towards CPU
  The maximum speed is defined by the frequency of the TE20,i.e. 4.2 /us.

- Buffer loading phase from CPU
  The maximum speed is defined by the highest frequency of the TE10 considered as being simultaneous to the TU20, i.e. 5.3 /us.
- Printing phase
  The limit is fixed by the maximum speed of the printing unit. It is of 10 chrts/sec.

8.8. Special circuit - IMGE

A new board with the SCL1 circuitry standard was designed for the GIT 100.

It serves to drive the circuit "CONSTANT CURRENT 0.5000 Amp SELECTOR MAGNET DRIVER" contained in the teletypewriter D.O.E.

The IMGE supplied a positive pulse of constant current of 20 mA (+10%) when at its input there is a 0 Vdc voltage.

If , instead, at the input there is a continuous +4 Vdc.voltage, it becomes an open switch, as it does not given or receive current.

8.9. Testing procedures

8.9.1. Off-line testings and adjustments

The wirings, and the boards are to be tested according to the related procedures.

8.9.1.1. Boards testing

In order to test the various special boards used in the logic of the controller there are special procedures indicated in the single testing specifications.

They are :

- Board MOBE 0D testing procedures No. 015740520
- Board MUTE " " No. 149740790
- Board IMGE " " No.

To test the remaining boards, test configurations studied on purpose are used.

8.9.2. The one-shot circuits are to be adjusted according to the'one-shot circuits times list" No. 78B102873.

2

1. Project Description and Performance

1.1 Introduction

All the performances described have project value and are not subject to modification during testing.

1.2 Description

This is a coincidence selection, random access memory utilizing a ferrite core matrix and is used as buffer for the MZ4/1100 control unit.

1.3 Main Data

1.3.1 Capacity: 256 characters of 8 bit

1.3.2 Memory cycle time

1.3.2.1 - Definition -

The cycle is defined as the lapse of time elapsing between two consecutive TE031 pulses (negative edge).

1.3.2.2 - Value -

Its nominal value has been determined on the basis of statistic evaluations (1) for an $^{\varepsilon}T = 8x10^{-5}$ faulty performance probability and, its upper and lower limits have been computed through different Y probabilities:

Nominal value = 4055 nsec.

$Y = 10^{-2}$	3800/4310	nsec.
$Y = 10^{-3}$	3780/4330	nsec.
$Y = 10^{-4}$	3760/4350	nsec.
$Y = 10^{-5}$	3745/4365	nsec.

(1) - See "MZ4 Buffer Memory Cycle Time Statistic Evaluations" report
E. Mondino - 9/14/65

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1.3.3 Access Time

1.3.3.1 - Definition -

This is the time elapsing between the negative edge and the TE031 pulse (cycle start) and the output of the information (MEOn and MEOnN).

1.3.3.2 - Value -

The extreme values of the access time have been determined through similar statistic evaluations for $^{\delta}T = 8x10^{-2}$ and are:
500 - 840 nsec.

1.3.4 Cperating Modes

Clear - Write (C.W.)
Read - Restore (R.R.)

1.3.5 Type of logic

The logic levels and signal impedances, both for input and output, must be compatible with the Standard SCL1 circuits.

1.3.6 Voltage Supply

Single + 20 volt supply is used. Maximum required current is approximately 3.0 A.

1.3.7 Environmental conditions

The memory will function correctly within an ambient temperature range from 10° to 38° C with a U.R. = 20 + 80%.

1.3.8 Composition

The memory module is composed by:

1. One-shot timing circuits and control circuits.
2. Selection and drive circuits.
3. Read preamplifiers.
4. Read and write register.
5. Inhibit drive circuits.
6. Interface circuits.

7. Core memory stack and relative steering diodes and transformers - thermodependent circuit for drive current control.

Parts 1 + 6 are grouped under MEM 170 and 7 takes the name MEM 180.

1.3.9 Size

Regards a 2-line, self-bearing standard module.

1.3.10 Connection

The memory module can be connected to its control unit through no. 4 NS 47/40 cm. cables.

1.3.11 Ventilation

No autonomous ventilation group has been provided because the module is usually installed in association with that of the control unit: if this is not the case, ventilation must be provided.

1.3.12 Core Memory Stack

The memory stack, which is 16x16x8, uses ferrite cores.
MIT type sense wiring is used thus making the worst noise case pattern as the following:

```
1001 .... 1001
0110      0110
0110      0110
1001      1001
 .          .
 .          .
 .          .
1001      1001
0110      0110
0110      0110
1001 .... 1001
```

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2. Memory Operating Procedure

2.1 Introduction

The memory operating procedure brings us back to two phases which coincide with the operating modes described in point 1.3.4.
In the first phase the data to be printed is transferred from printer control unit to store with a digit period determined by the Central Unit of the computer; in the second the data is transferred from memory to printer control unit with a digit period determined by the length of the delay line of the memory.
The maximum allowed cycle time, that is no.~4.3 µsec., is determined by the speed of the printer.
For the logical outline see drawing no. 140125710

2.2 First phase (C.W.) description

In the first phase a memory clear operation is performed, followed by outside writing (AIBU, BIBU, etc.).
In this phase, distinguished by the CORI command being brought to logic level "0", the delay line starts on the TE00 pulse coming from control unit, performs a read and write cycle and stops to wait for the following pulse: the repetition period of this pulse must be greater than or equal to the maximum allowed cycle time.
The read-write register is loaded by the outside (AIBU, BIBU, ... , MIBU), while the signals coming from memory are blocked, denying consent to the strobe (CORIN).
However, in the case of completion of a print line with zeroes, this occurs automatically since the CORI signal is brought back to logic level "1" so as to allow recycling, while the clearing out of the memory is obtained by not sending the strobe (LETA), having brought the FIBEA signal to level "1".
At the end of each digit period a count pulse (TE02N) will appear: its trailing edge will set the counter at the next address: this will take place until the prefixed address, where control-memory data transfer will stop.

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2.3 Description of the second phase (R.R.)

In the second phase a read and restore operation (R.R.) is performed, thus operating a data transfer from memory to printer through its control unit.
In this phase the delay line receives a starting pulse (TE00) and a recycle consent bearing the CORI signal at logic level "1": the line will therefore recycle until the decoding of the prefixed address will stop the counter on the next address on the printer control unit, and, at the same time, stop the recycle (this phase must last less or the same period of time as that during which the drum line, containing the characters, remains under the printing hammers: the maximum memory digit period is thus determined, in this case ~4.3 µsec., owing to printer speed.).
The information coming from the memory preamplifiers (PE01, ..., PE08) is first staticized in the register and then restored in the same core memory stack: meantime, the control unit takes care of blocking all external writing channels.
Besides the information read in memory, the control unit receives a timing signal, lasting about 1.8 µsec. (TIBUN), during which a comparison between the character read in memory and that ready on the print line is made by the control unit: in case of identity, print of the character is set.

3. Store-control unit interface

3.1 Introduction

The following tables illustrate the characteristics regarding the signals exchanged between memory and printer control unit.

3.2 Store input signals

Function	No.	Name	Type	Level	Driving Circuit	"NOR" Loading
Information Writing	8	AIBU,BIBU,CIBU DIBU,EIBU,GIBU LIBU,MIBU	Pulses	true	NOR	5

Function	No.	Name	Type	Level	Driving Circuit	"NOR" Loading
Address Signals	16	CI011 ÷ CI081 CI01A ÷ CIC8A	Signals "	True False	INPO INPO	10 10
Delay line Start	1	TE00	Pulse	False	NOR	5
Register Clearing	1	CAGU A	Level	False	NOR	5
Recycle Connent	1	CORI	Level	True	NOR	5
Memory Clearing	1	FIBE A	Level	False	NOR	5

Note: Loading is expressed at control unit interface level: the connecting cables must be NS 47/40 cm. type.

3.3 Memory output signals

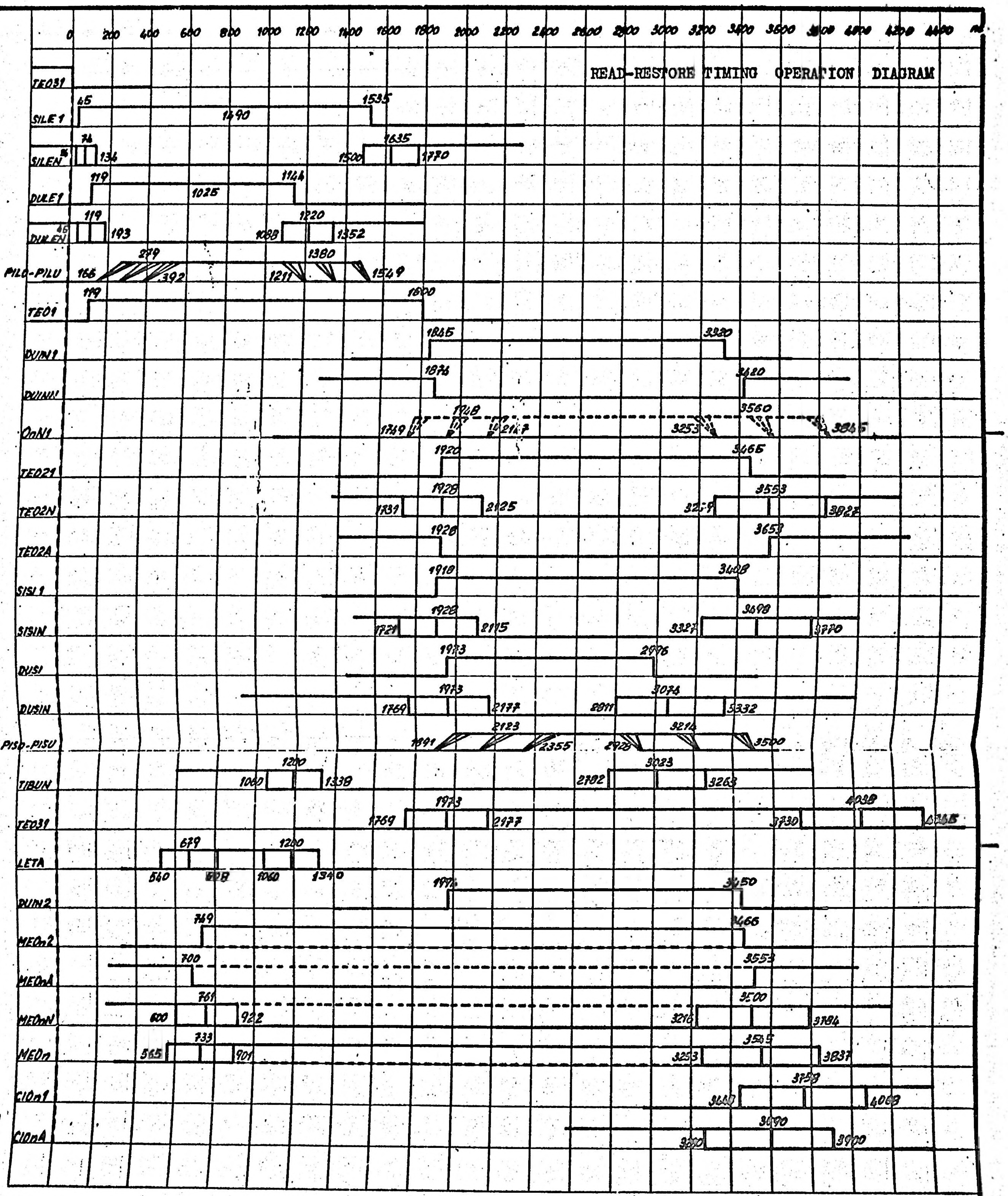
Function	No.	Name	Type	Level	Driving Circuit	"NOR" Loading
Information Reading	8 8	ME01-ME08 ME01N-ME08N	Signals	True False	NOR NOR	5 5
Count Pulse	1	TE02 N	Pulse	False	INPO	10
Comparison for printing	1	TIBUN	Pulse	True	NOR	5

Note: Loading is expressed at memory interface level: the connecting cables must be of the NS 47/40 cm. type.

3.4 Timing

For timing please see the attached diagrams and the MEM 170 manual block logic drawing

READ-RESTORE TIMING OPERATION DIAGRAM



N O T E S : 1) The graph shown regards the faulty performance condition computed for $\varepsilon_T = 8 \times 10^{-5}$ and for a digit period having a $Y = 10^{-5}$ probability.

2) The spread has been graphically shown only for the more important signals: the median line refers to nominal time.

3) On the basis of the project layout it is always guaranteed that the duration of the drive currents (PILO/PILU and PISO/PISU- "AND" function is always longer than 680 nsec. at 90%, though included in the ambit of the spread shown (see report quoted on pag. 1): the same is true for the inhibit currents OnN1 (for n = 1 ÷ 8).

Honeywell
Honeywell Information Systems Italia

MEM 170 + MEM 180
Buffer Memory MZ4/1100 P.D.S.

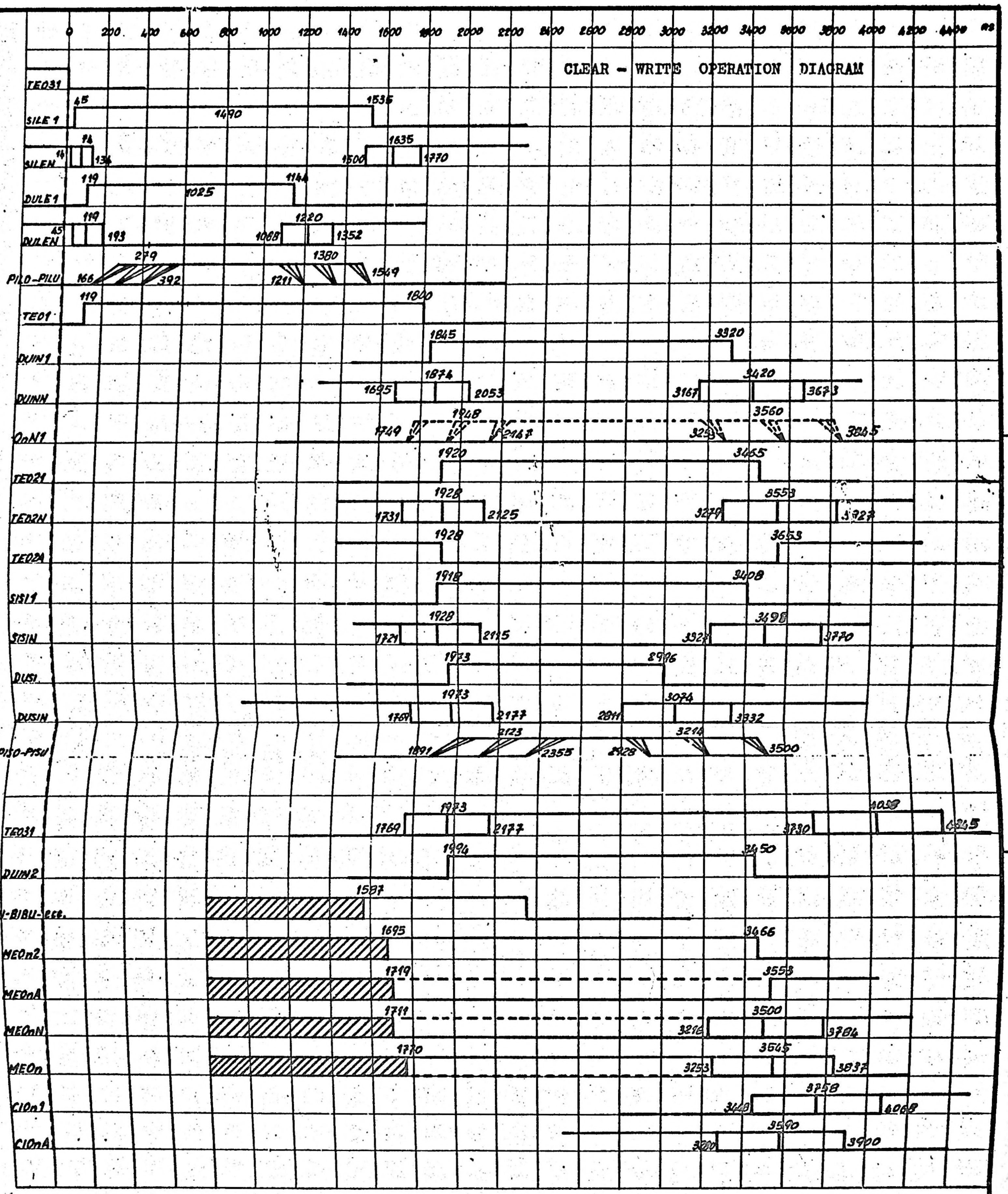
Scala	Firma
//	Gmandi
ST	21-6-67
MAT.	TT
	FIN.

MOD.	DATA	VISTO
RF	6-28-67	
	1-9-67	

N°. CODICE

npm | DISEGNO

N°. DISEGNO
30074 0300/A

# CLEAR - WRITE OPERATION DIAGRAM

N O T E S :

1) The graph shown regards the faulty performance condition computed for $\varepsilon_T = 8 \times 10^{-5}$ and for a digit period having a $Y = 10^{-5}$ probability.

2) The spread has been graphically shown only for the more important signals: the median line refers to nominal timing.

3) On the basis of the project layout it is always guaranteed that the duration of the drive currents (PILO/PILU and PISO/PISU) "AND" function is always longer than 680 nsec. at 90%, though included in the ambit of the spread shown (see report quoted on pag. 1): the same is true for the inhibit currents OnN1 (for $n = 1 \div 8$).

Honeywell Honeywell Information Systems Italia	MEM 170 + MEM 180 Buffer Memory MZ4/1100 P.D.S.	MOD.	DATA	VISTO
		PEF	6/10/67 1-9-67	
Scala	Firma			
ST	20-6-67			
MAT.	TT	FIN.		

N°. CODICE

npm | DISEGNO

N°. DISEGNO 30074 030⁰/A 8

F.to 297x420

INSTALLATION

Honeywell
Honeywell Information Systems Italia

CONSOLE TYPEWRITER SUBSYSTEM

CTW 101

Installation

A Field Engineering
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1. INTRODUCTION

The purpose of this manual is to outline the operations required to install a CTW 101 Typewriter Subsystem.
The hereby set out description presumes that the site has been adequately prepared according to the requirements quoted in the Site Preparation manual but do not directly consider the single system configuration; in-fact, the installation engineer and/or team will draw all the necessary details from the following 2 auxiliary documents, individual to each installation:

a) - Site Layout

Giving the collocation of the subsystems in the site and showing those accessories which, though not normally supplied with the subsystems, are necessary to overcome particular space or operative problems.
(i.e. - extra low level cable ducts, troughs, etc. .)

b) - Unified Subsystem Connections (USC)

The forms bearing the above name give information upon the connection of the subsystem to:

- CPU or 1st MPA
- AC supply breakers
- centralized DC Power Supply
- fan supply and control terminal strip
- AC supply control circuit

A detailed description on how to use the USC forms, which also give details on the insertion of calibration plugs and terminator boards, will be found in the CPU Installation manual P.N. 4.625.0.000.0/A.

The final subsystem check-out must only be carried out if all the system structural and electrical connections have been completed and if the CPU and program loading subsystem check-outs have been accomplished.

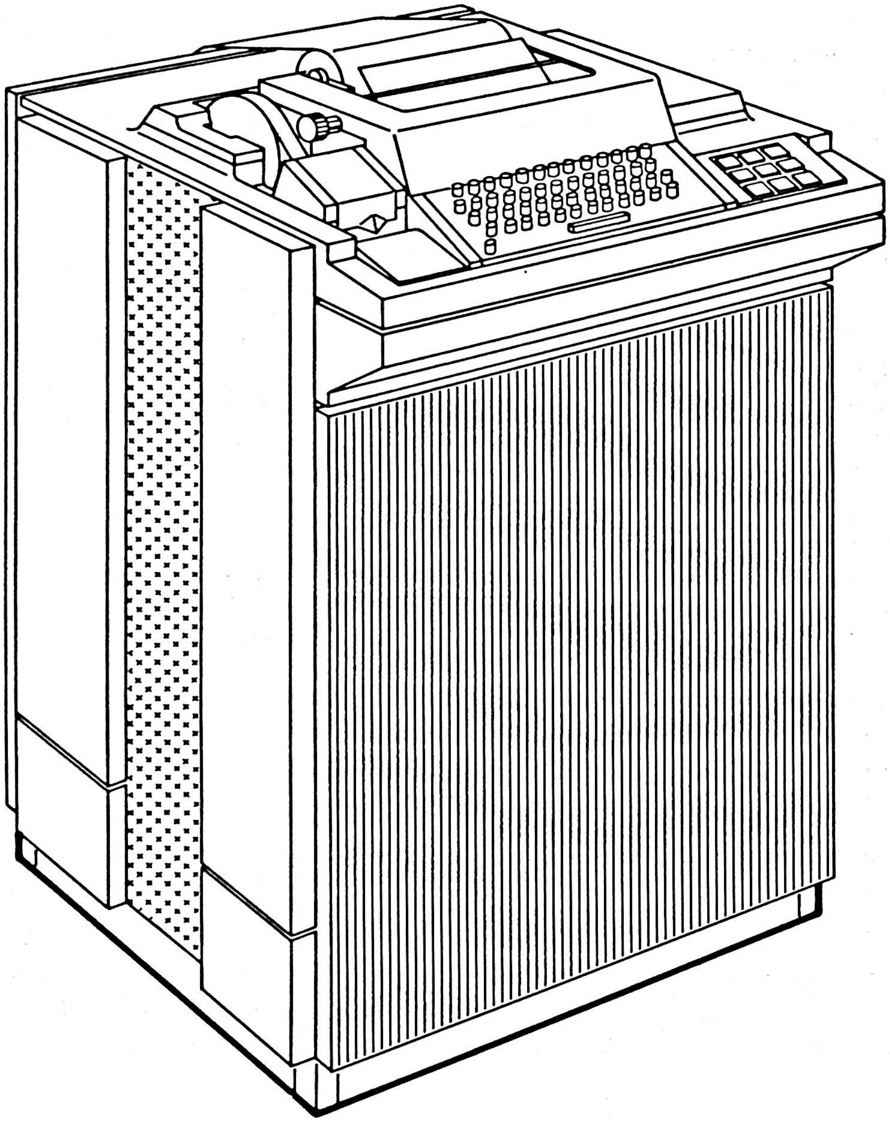

Fig. 1.1. - CTW 101 Subsystem

2. TOOLS AND INSTRUMENTS

The operations to be performed during the installment of this subsystem may be carried out with the aid of the following equipment:

- engineer's tool kit
- site tools

3. ACCEPTANCE AND COLLOCATION

3.1. - PACKING

- The subsystem and its pertinent accessories and documentation are normally shipped in two crates.
- External to each package crate are affixed forms which bear:
  - the contents of the crate
  - the guide to uncrate and remove from the battened transport base ("Pallet" or "Shipping skid").
- The second crate contains a stool necessary to operate on the subsystem both standing up and seating down.

3.2. - ACCEPTANCE

- Upon receipt, all packages are to be visually examined for damage and if any damage is revealed, it will be necessary to:
  - have the carrier witness the entity of the damage
  - submit an immediate detailed report to the district manager
  - fill-in any enclosed shipping forms.

3.3. - UNCRATING

- Ensure that the subsystem is uncrated as per rules set out by the uncrating guide attached to the outside of the crate and that the contents tally with the description.
- Remove the documents and accessories contained in the crates and neatly set them aside so as not to impede the installation operations.

3.4. - COLLOCATION

- Once uncrated, and it has been assured that all equipment is accounted for and no damage was sustained, proceed to place the subsystem as per site layout plan. The CTW 101 is physically located beside the CPU console.
- Set aside all those parts used for shipment and withold for subsystem withdrawal operations. See par. 9.
- Remove the panels and covers from Wings A and B.

4. MECHANICAL ASSEMBLY

- Remove both front and rear panels from the subsystem cabinet.
- Free the PWBs module by loosening the screw that holds strap 1.
  Refer to dwg. 78B102828.
- Free the chad box by loosening the screws that fix bracket 2 and fit it in position.
  Refer to dotted lines on dwg. 78B102828.
- Loosen the screws that fix the stand-off toe plate (front and rear side).
- Lift all the subsystem wheels 3 to 4 mm from the floor by lowering the 4 stand-offs to prevent unit from rolling.
- Tighten the lock nut.
- Level-up the subsystem.
- Replace the stand-offs toe plates.

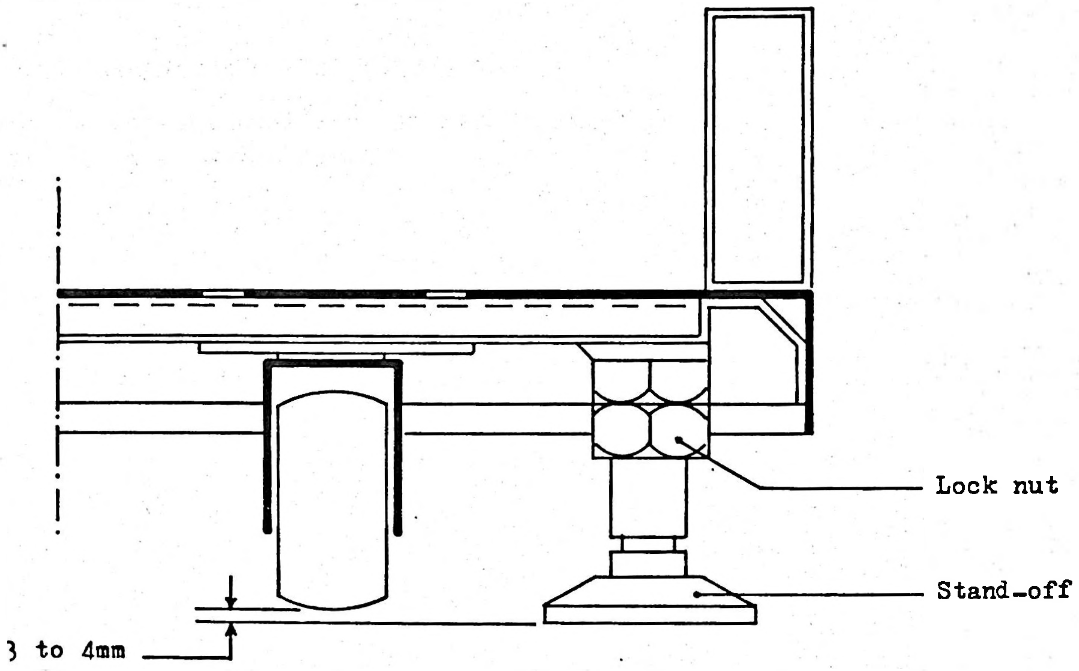

Fig. 1.2. - Stand-off adjustment

- Remove the feed roller (platen)knob.
- Remove the cabinet top cover by loosening the two knobs located under the mechanics deck.
- Free the head carriage by cutting the "Typewriter" support tie-wire.
- Loosen the screw fixing the "Typewriter" to the center of the casting. Access to this screw, located approx. 2 cm from keyboard letter 7, is gained from the mechanics deck.

  IF THIS SCREW IS LEFT IN, ERRORS MAY OCCUR DURING A NORMAL PRINT OUT.

5. CABLE CONNECTIONS

5.1. - CONNECTIONS BETWEEN THE SUBSYSTEM ELEMENTARY UNITS

For subsystem elementary units connections refer to dwg. n° 78C102862 and table.

5.2. - SUBSYSTEM TO SYSTEM CONNECTION

Locate each connecting point by referring to the cable markings themselves and, for those bearing symbolic markings, by consulting the system USC forms.

In case a cable check-out is to be carried out or should difficulties in the interpretation of markings be encountered, consult the following drawings:

. 78X102864	Cable kits
. 78B102865	Cable installation
. 78B102866	Cable markings and connections

5.3. - CPU TERMINATOR BOARDS INSERTION

To trace the correct position in which TACA-A board has to be inserted, consult the USC forms - Table "L".

6. VISUAL CHECKS

6.1. - TYPEWRITER

- Check for machine status and correct values of fuses.

- Mount the inked ribbon, punch tape and paper.

6.2 - CONTROLLER AND AUXILIARY EQUIPMENT

Check for:

- no bent or broken pins
- correct insertion of all the PWB's
- correct insertion of cables internal to the subsystem
- correct fuse values (VAR 580).

7. CHECK-OUT

7.1. - OFF-LINE CHECKS

The hereby listed checks are only to be carried out if the entire system mechanical assemblies and electrical connections have been completed.

- Fit the VAR 591 relay (located on Wing B) as shown in the USC form - Table "P".
- Set the typewriter breaker to ON.
- Power-up the CPU with both ac and dc voltages and check that:
  - . the fans of VAR 640 rotate
  - . the OFF lamp, on the operator panel, lights.
- Depress the operator's panel ON pushbutton.
  The pertinent indicators and the STAND BY lamp must light.
- Switch the punch unit on.
- Depress the RETURN and LINE FEED keys and check for correct functioning.
- Depress the keyboard's 63 characters and space bar and check that the printed characters correspond to the respectively depressed keys.
- Depress both the RETURN and LINE FEED keys.
- Insert paper tape in the reader and depress START.
- Check that characters printed by the reader correspond to those previously printed by the keyboard.
- Remove power from both reader and punch.
- Depress the operator's panel OPERATE pushbutton.
  The pertinent indicator must light and the STAND BY lamp must extinguish.
- Depress a type writer key and check that the corresponding character is not printed.

7.2. - ON LINE CHECKS

These checks are only to be carried out after the CPU, typewriter and reader final check-out operations have been accomplished.

Feed the tests through by following the instructions on the actual diagnostic itself:

. ISOLATION TEST	4T4720801
. FUNCTIONAL TEST	4T4720901
. SEMI MANUAL TEST	4T4721001

8. FINAL OPERATIONS

8.1. - SKIN-UP

- Check that type, serial number and product code (on the yellow label) correspond to the description given on the "Product Composition Sheet".
- Replace all panels, covers and feed platen knob previously removed.

8.2. - CHECKS AFTER HANDOVER TO CUSTOMER

- Check that the subsystem documentation corresponds to the list in the Reference Index inserted in the Diagnostics Manual (1st page).
- Check that the subsystem drawings and their updating indices, shown in the subsystem folder, correspond to those given in the "Product Composition Sheet".
- Transcribe the relevant indices on the F.C.O. Status Log.

Note

Those drawings having several sheets with the same drawing number, are shown on the Product Composition Sheet with the highest updating index.
On the other hand, the FCO Status Log must show the index of each sheet.

- Insert in the Controller - D.O.E. folder code 4.111.2.004. , dwgs. 181821, 6353WD, 6354WD relative to the mechanics (GIT 410).
- Check that the following parts are supplied with the subsystem:
  - . spare parts shown on List 78X103099
  - . accessories (inked ribbon, tape, paper) shown on List 15024278.
- Prepare a report giving details of snags or defects found during the installation.

The first 20 CTW 101 subsystems will be accompanied by the "Surveillance Plan" which must be thoroughly and faithfully filled in.

9. WITHDRAWAL

When a subsystem is to be withdrawn from a site, it must be removed complete of all the cable and part kits that were originally consigned.

9.1. - OPERATIONS

- Remove all subsystem power.
- Remove both rear and front panels from cabinet.
- Remove on the ALI 260 the breaker furnishing ac power to the subsystem. For useful information refer to the USC form.

9.2. - DISASSEMBLY OF CABLES AND MECHANICAL PARTS

- Disconnect all those cables listed in dwg. 78B102866.
  All the cables that are marked with a cross are only to be disconnected from the outer side of the subsystem and grouped on the lower cabinet compartment.
  All other cables must be grouped and marked with the kit 0643384 G.
  Refer to dwg. 78X102864.
- Tie-up in the first row with not flexible wire the head carriage so as to prevent carriage from rolling.
- Secure the "Typewriter" to the center of the casting.
  Tighten the screw from the lower side of the mechanics support deck in the appropriate hole located 2 cm approx. from keyboard letter 7.

  THIS SCREW MUST BE FITTED IN TO AVOID DAMAGES DURING TRANSPORT.
- Clean all the VAR 640 fan filters.
- Secure both PWB's module and chad box.
  Refer to dwg. 78B102828.
- Screw-in the cabinet stand-offs so as to allow the subsystem to be shifted on its wheels.
  Refer to dwg. 1.2. par. 4.

9.3. - SUBSYSTEM REMOVAL

The subsystem must be completed of:

- Cable Kits
- Subsystem documentation; subsystem documentation list is shown on the Reference Index inserted in the Diagnostics Manual (1st page).
- All not yet implemented FCOs.
- Product composition sheets.
- Special tools
- Upon completion of the withdrawal operations, proceed to fill-in the appropriate service reports and all other necessary forms.

10. ATTACHED DRAWINGS

To complete the present Installation Manual, the following drawings and part lists have been attached.

Description	Dwg.
Parts Installation	78B102828
Physical unit	78C102862
Cable kits	78X102864
Cables Installation	78B102865
Cable markings and connections	78B102866
Spares List	78X103099
Accessories List	15024278

78B102828

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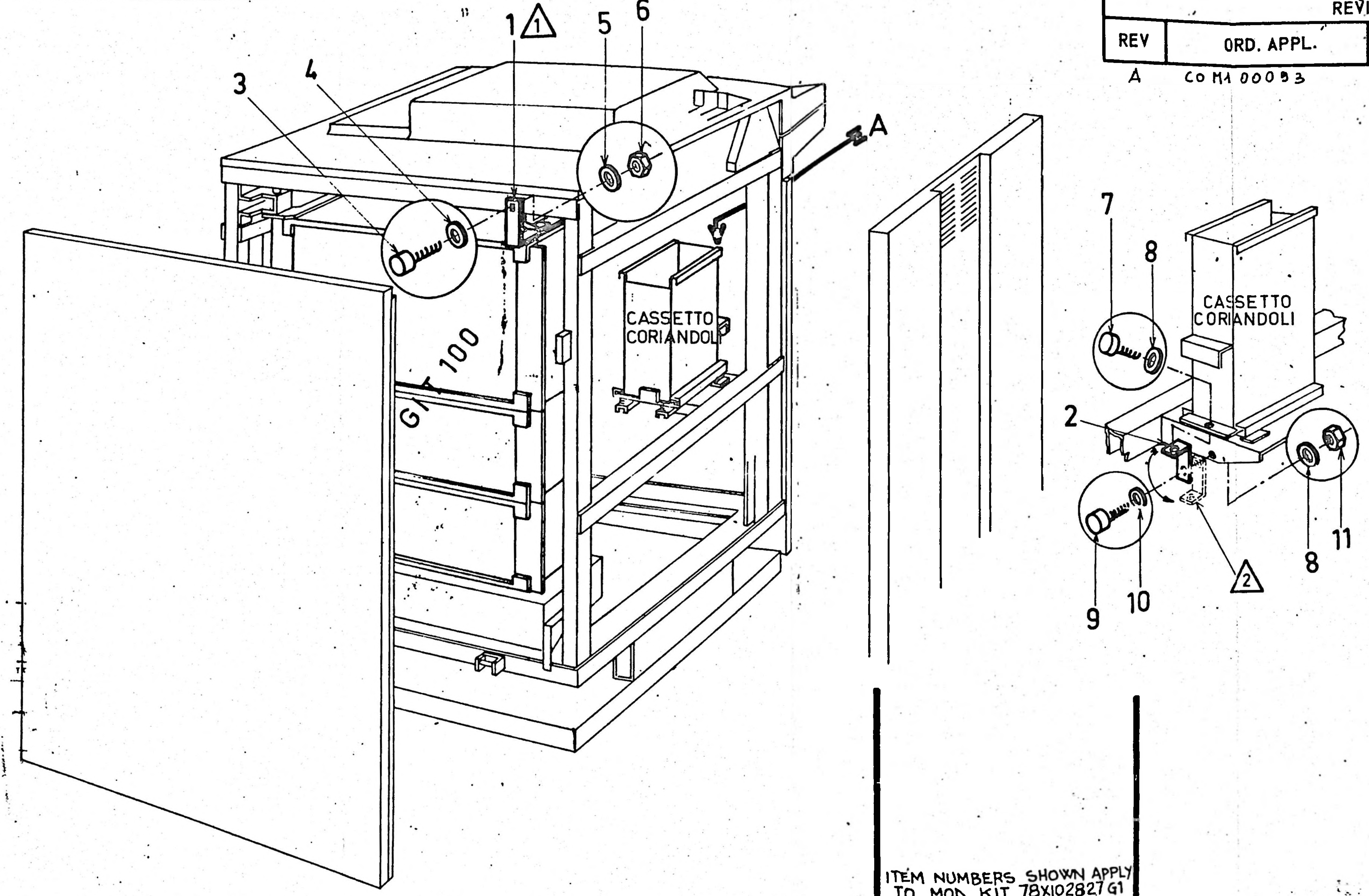
REV	ORD. APPL.	DATA. A	DATA. M	DATA. G	FIRMA
A	COM100093	70	04	22	Conti



ITEM NUMBERS SHOWN APPLY TO MOD. KIT 78X102827 G1

NOTES

△2_ A CASSETTO CORIANDOLI SBLOCCATO RUOTARE DI 180° LA SQUADRETTA A POS.N° 2.

△1_ IL FISSAGGIO DELLA STAFFA POS.N°1 DEVE ESSERE EFFETTUATO CON LE VITI PRE-ESISTENTI SU GIT 100.

PARTI NUMERATE SECONDO LISTA N° 78X102827 G1

NOTE

SALVO INDICAZIONE CONTRARIA
DIMENSIONI: MILLIMETRI / INCH
TOLLERANZE DIMENS. E DI FORMA VEDI:
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DESCRIZIONE PER SPEDIZIONE

INSTALL. PARTI

DISEGNO 78B102828
PAG 1/1
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CODICE

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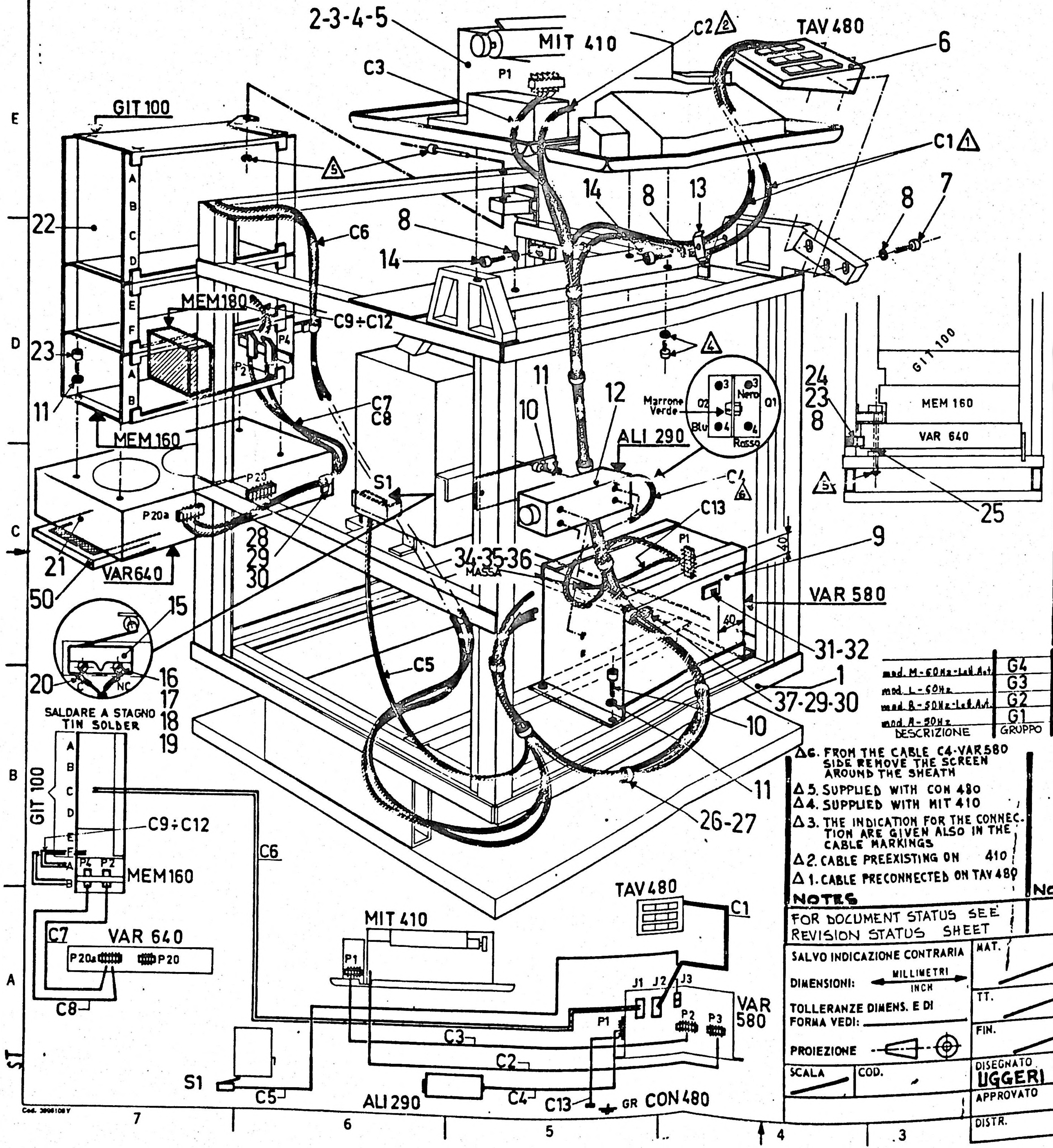

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REV	ORD. APPL.	DATA A	DATA M	DATA G	FIRMA

TABELLA COLLEGAMENTO CAVI
CABLES CONNECTION TABLE

RIFER.	POS. N°	CAVO TIPO	DA	A	NOTE
C1			TAV 480	VAR 580 - J2	① ⑤
C2			MIT 410	VAR 580-P3-1/2/3	② ④
C3	38	SEGN.T.T.Y	MIT 410 - P1 - 3	VAR 580 - P2 - 2	
			4	1	
			6	4	
			7	3	
				5	
C4	39	AL 147	ALI 290 - X	VAR 580 - P1 - 1	NERO BLACK
			Y	2	ROSSO RED
			Z	3	BLU BLUE
			GR	4	VERDE GREEN
C5	40	CA02	S1 - C/NC	VAR 580 - J3	
C6	41	NS107	GIT 100 - C02/03	VAR 580 - J1	
C7	42	AL108	MORS. BARRE P2	VAR 640 - P20a-5	
C8	43	AL107	MORS. BARRE P4	VAR 640 - P20a-4	
C9	44		GIT 100 - F02	MEM160 - A01	
C10	44		GIT 100 - F03	MEM160 - A02	
C11	44		GIT 100 - F04	MEM 160 - B02	
C12	44		GIT 100 - F05	MEM 160 - B01	
C13	45	AL 217	VAR 580 P1 - 5	MASSA CON 480	

DESCRIZIONE	GRUPPO	CODICE
mod. M - 60Hz - Lat. Art.	G4	0896301 E
mod. L - 60Hz	G3	0896300 A
mod. B - 50Hz - Lat. Art.	G2	0896299 B
mod. A - 50Hz	G1	0896298 F

Ⓖ1 Ⓖ2 Ⓖ3 Ⓖ4

△6. FROM THE CABLE C4-VAR580 SIDE REMOVE THE SCREEN AROUND THE SHEATH
△5. SUPPLIED WITH CON 480
△4. SUPPLIED WITH MIT 410
△3. THE INDICATION FOR THE CONNECTION ARE GIVEN ALSO IN THE CABLE MARKINGS
△2. CABLE PREEXISTING ON 410
△1. CABLE PRECONNECTED ON TAV 480

NOTES

FOR DOCUMENT STATUS SEE REVISION STATUS SHEET

NOTES

△6. DAL CAVO C4, LATO VAR 580, ASPORTARE LO SCHERMO A FILO DELLA GUAINA.
△5. FORNITI CON CON480
△4. FORNITE CON MIT 410
△3. LE INDICAZIONI PER IL COLLEGAMENTO SONO INDICATE ANCHE NEI MARCACAVI.
△2. CAVO PRE-ESISTENTE SU MIT410
△1. CAVO PRE-COLLEGATO SU TAV480

NOTE

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VEDI TABELLA

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CODICE			
G1	0643384 6	G5	
G2		G6	
G3		G7	
G4		G8	

PL 78X102864 PAG. 1/1 REV. A

*	POS. NO	C D	NUMERO DI IDENTIFICAZIONE	DESCRIZIONE DELLA PARTE		GRUPPI E QUANTITA' G1	G2	G3	G4	G5	G6	G7	G8	U M
	1	0	00514 077	CAVO NS45	0641231L	4								EA
	2	0	00524 153	CAVO AL 100	0640400F	1								EA
	3	0	00524 153	CAVO AL 101	0640405H	1								EA
	4	0	00524 117	CAVO AL 117	0640481C	1								EA
	5	0	00524 147	CAVC AL 147	0640657E	1								EA
	6	0	00524 141	CAVO AL 141	0640623A	1								EA
	7	0	78B102865	INSTALLAZ. CAVI		X								
	8	0	78B102866	MARCAT. E COLL.		X								
	9	1	5613640B	CINTURINO	5613640B	50								CM
	10	1	5613652R	CAPSULE	5613652R	3								EA

S.T.

COMPIL. UCLERI

CD - CODICE DI DISEGNO

0 - DISEGNO ISG
1 - PARTE ACQUISTATA A CATALOGO
2 - RICHIAMO DI PIU' ALTERNATIVE
3 - PARTE A CATALOGO DA MODIFICARE
4 - PARTE ISG DA MODIFICARE
5 - PARTE DA SELEZIONARE

UM - UNITA' DI MISURA

EA
- NUMERO
IN - INCH
G - GRAMMO
CM - CENTIMETRO

* ULTIME POSIZIONI MODIFICATE

DESCRIZIONE
KIT CAVI CTW101

PL 78X102864 PAG. 1/1 REV. A

Cod 3898111G

PER LE MODIFICHE VEDI FOGLIO REVISIONE

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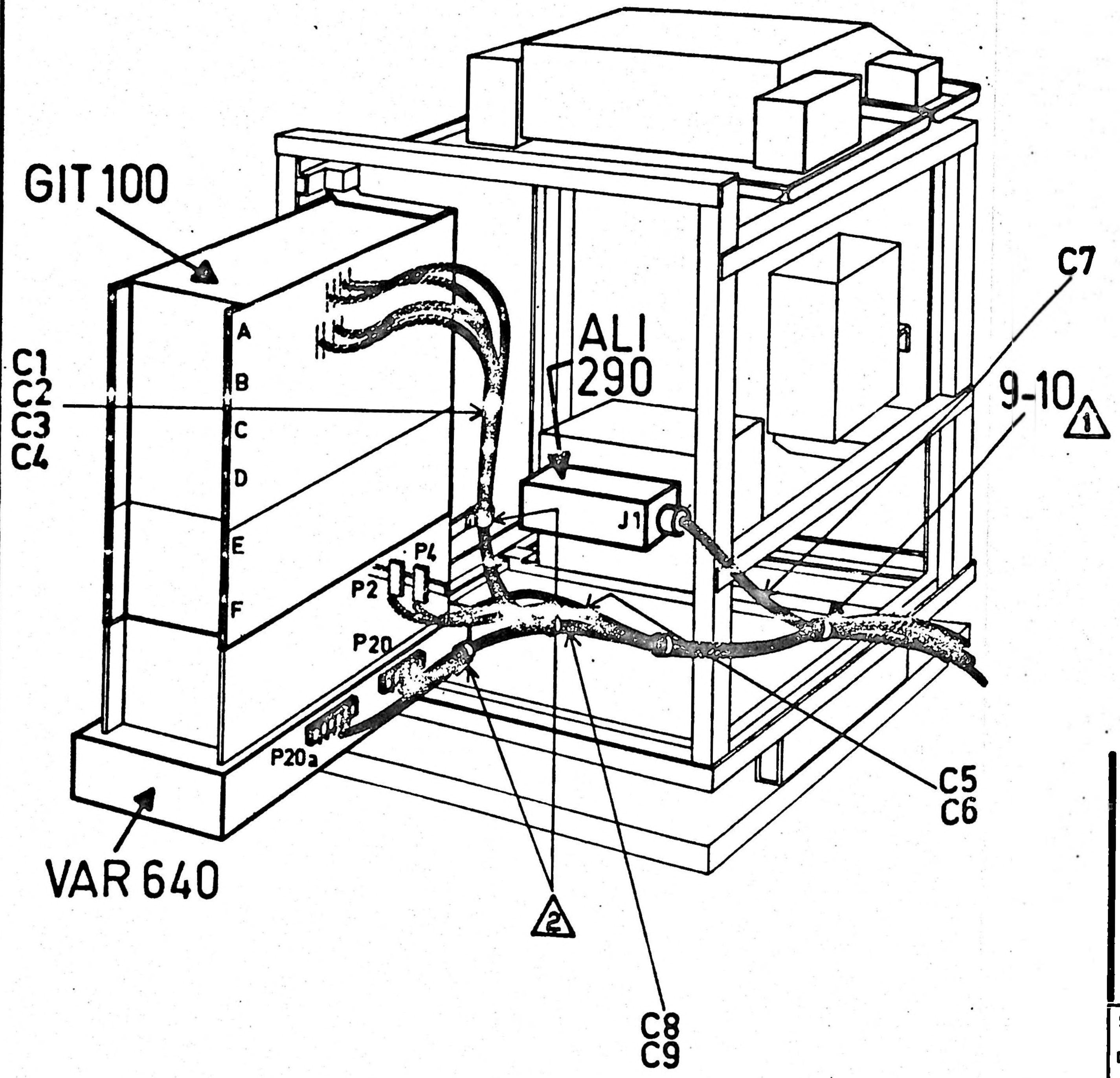
A	COM 00093	70	04	22	Conta



S.T.

CAVO	△1 POS. Nº
C1	1
C2	1
C3	1
C4	1
C5	2
C6	3
C7	4
C8	5
C9	6

NOTE

△2. SERRACAVI PRE-ESISTENTI

△1. POS. Nº RIFERITO ALLA LISTA Nº 78X102864G1

SALVO INDICAZIONE CONTRARIA

DIMENSIONI: MILLIMETRI / INCH

TOLLERANZE DIMENS. E DI FORMA VEDI:

PROIEZIONE

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INSTALLAZ. CAVI

DISEGNO 78B102865

PAG 1/1

REV A

CODICE

78B102866

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REV	ORD. APPL.	DATA A	DATA M	DATA G	FIRMA
A	COM100093	70	04	22	Conte

△1	RIF. REF.	TIPO TYPE	△2 G1		MARCATURA E COLLEGAMENTO CAVI CABLE CONNECTION AND MARKING △3 LATO INT. ALL' U.F. SIDE INT. TO PH. UNIT CTW 101	LATO EST. ALL' U.F. SIDE EST. TO PH.UNIT	FUNZ. FUNCT.	NOTE NOTES
X	C1	NS 45	1		GIT 100 A02	L CTW 101 A	Logica	
X	C2	NS45	1		GIT 100 A03	B	Logica	
X	C3	NS45	1		GIT 100 B02	C	Logica	
X	C4	NS45	1		GIT 100 B03	D	Logica	
X	C5	AL 100	2		P 4	U-CTW101 - +20	D.C.	4
X	C6	AL 101	3		P 2	U-CTW101 MASSA	D.C.	5
	C7	AL 117	4		ALI 290 31	T CTW - X	A.C.	5
						Y	A.C.	6
						Z	A.C.	7
						Gr.	A.C.	9
						Gr.	A.C.	8
	C8	AL 147	5		VAR 640 P20 1	VCTW - 1	A.C.	6
					2	2	A.C.	7
					3	3	A.C.	5
					4	4	A.C.	8
					5	5	A.C.	9
	C9	AL 141	6		VAR 640 P20 1	VCTW - 7	Cont.	8
					2	8	Cont.	4
					3	9	Cont.	5

S.T.

FOR THE CABLES ASSEMBLY
SIDE REF. TO DRAW No 78B102865

10 - WHITE
9 - GREEN
8 - BROWN
7 - BLUE
6 - RED
5 - BLACK
4 - YELLOW

△3 - SEE LABELLING INSTRUCTION DRAWING No 09874 010

△2 - ITEM NUMBERS SHOWN APPLY TO DRAWING No 78X102864

△1-X - PARTS ASSEMBLED WHEN DELIVERED

NOTES

PER IL MONTAGGIO CAVI
VEDI DIS. 78B102865

10 - BIANCO
9 - VERDE
8 - MARRONE
7 - BLU
6 - ROSSO
5 - NERO
4 - GIALLO

△3 - VEDERE ISTRUZ. MARCATURA DIS. No 09874 010

△2 - PARTI NUMERATE SECONDO LISTA DIS 78X102864

△1-X - PARTI MONTATE ALLA SPEDIZIONE

NOIE

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DESCRIZIONE
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G1	0643385 C	G5	
G2		G6	
G3		G7	
G4		G8	

PL 78X103099	PAG.	REV.

*	POS. NO.	CD	NUMERO DI IDENTIFICAZIONE	DESCRIZIONE DELLA PARTE		GRUPPI E QUANTITA' G1	G2	G3	G4	G5	G6	G7	G8	UM
	1		0001218 V	FUS.0,5A-250V SLOBLO	0001218V	1								EA
	2		5375110 F	FUS.3/8A-250V SLOBLO	5375110 F	1								EA
*	3		0001244 X	FUS.3A-125 V SLOBLO	0001244 X	1								EA
	4		0001243 A	FUS.2A-125V SLOBLO	0001243A	1								EA
	5		0001262 G	FUS.3A-250V	0001262G	1								EA
	6		0001258 Z	FUS. 0,5 A	0001258Z	1								EA
	7		0001259 V	FUS. 1A-250V	0001259V	1								EA
	8		0001823 D	LAMPADINI CMB	0001823D	1								EA

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CD - CODICE DI DISEGNO

0 - DISEGNO ISG
1 - PARTE ACQUISTATA A CATALOGO
2 - RICHIAMO DI PIU' ALTERNATIVE
3 - PARTE A CATALOGO DA MODIFICARE
4 - PARTE ISG DA MODIFICARE
5 - PARTE DA SELEZIONARE

UM - UNITA' DI MISURA

EA ~~N~~ - NUMERO
CM - CENTIMETRO
IN - INCH
G - GRAMMO

* ULTIME POSIZIONI MODIFICATE

DESCRIZIONE

LISTA RICAMBI

PL 78X 103099	PAG. 1/1	REV. B.

Cod. 3896111 G

PER LE MODIFICHE VEDI FOGLIO REVISIONE

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SIMB.	CODICE *CODE*	DESCRIZIONE *DESCRIPTION*	QUANTITÀ *QUANTITY*
	5681015 I	Rotoli di nastro inchioetrato per TTY	1
	5679015 X	Rotoli di banda di carta	1
	5679035 2	Rotolo di carta per stampa	1

SIGLA PRODOTTO *PRODUCT INITIAL*	DESCRIZIONE PRODOTTO - *PRODUCT DESCRIPTION*	RIF *REF.*
	Terminale TIME-SHARING TIME-SHARING TERMINAL	

1	2	3	4	5	6
0646898 D					

RIF - *REF*

NOTE

REV.	DEF 1	99430 F.V.	13·9·68 4·10·68

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MAINTENANCE

Honeywell
Honeywell Information Systems Italia

CONSOLE TYPEWRITER SUBSYSTEM

CTW 101

Maintenance

A Field Engineering
Publication

4.111.4.001.0/A

Honeywell
Honeywell Information Systems Italia

REVISION STATUS

UPDATE Nº	REVISED PAGES	DATE
	First Edition - Title Page P.N. 4.111.4.001.0/A	October 1970

N.B. Remove pages identified with crossed numbers

INDEX

1. OPERATOR TASKS Pag. 1

2. MAINTENANCE CHECKS " 3

3. CLEANING AND LUBRICATION " 5

4. ADJUSTMENTS " 7
4.1. CONTROLLER ONE-SHOTS TIMING " 9
4.2. MEMORY ONE-SHOTS TIMING " 12

1. OPERATOR TASKS

Note

Refer to Teletype Corp. Bulletin 273 B or 310 B - Vol. 1.

2. MAINTENANCE CHECKS

Note

Refer to both Teletype Corp. Bulletin 273 B or 310 B - Volumes 1 and 2 - and HISI Maintenance Schedule Type G code No 4.014.4.647. /A.

3. CLEANING AND LUBRICATION

Note

Refer to both Teletype Corp. Bulletin 273 B or 310 B - Volume 1 - and HISI Lubrication Plan code No 4.014.4.648. /A.

4. ADJUSTMENTS

(Controller and Device Oriented Electronics)

ROUTINE : 4.1

NAME : CONTROLLER ONE-SHOTS TIMING

ELEMENTARY UNIT : GIT 100

DURATION : 1 hr
PREREQUISITES : None

1 - NEEDED MATERIAL

- Screwdriver, 2.5 mm blade	P.N. 4355475 P
- Soldering iron	" 7144451 X
- CTW 101 Functional Test diagnostic	" 4T4720900
- CTW 101 Semi Manual Test diagnostic	" 4T4721000
- Oscilloscope	

2 - PURPOSE

- To obtain correct duration (signal length) of the below listed signals :
  - . TURI - Delays triggering of TUO2
  - . TUO2 - Command or character strobe from CPU
  - . MUTE - Character recognition pulses
  - . UNA1 }
  - . UNA2 } - 20 msec clock interrupt generators
  - . UNI1 - UNI2 command
  - . UNI2 - 350 ms END of BUFFER pulsation timings
  - . ULAMN - Lights-up the END of BUFFER indicator on the CTW operator panel.

3 - PROCEDURE

The one-shot timings must correspond to the figures shown in the following table :

SIGNAL	TIME	TOL %	ROW	PWB	PWB PIN	POT
TURI	2 µs	±5	D	02	01	Upper
TU02	1.2 µs	±5	D	02	10	Lower
MUTE	1.14ms	±2	D	06	16	
UNA1	10 ms	±5	D	04	01	Upper
UNA2	10 ms	±5	D	04	10	Lower
UNI1	1 µs	±5	D	03	01	Upper
UNI2	2.5 ms	±5	D	03	10	Lower
ULAMN	350 ms	±5	D	05	14	*

* Slow recovery one-shot (ULLM-A) without adjust pot.

3.1. - TURI · TUO2 · MUTE · UNA1 · UNA2 Timing

1) - Connect the scope input on the signal that is to be checked. Sync on INT "+".

2) - Set up both the system reader and printer for a CTW 101 Functional Test diagnostic run through.

3) - To check duration of :

- . TURI, TUO2 : recycle on diagnostic test 1
- . MUTE : recycle on diagnostic test 5
- . UNA1, UNA2 : recycle on diagnostic test 9

(To recycle on a given test, trip switch 1 on the CPU console).

4) - Appropriately vary the involved one-shot adjust pot to obtain the correct setting.

3.2. - UNI1 · UNI2 · ULAMN Timing

1) - Connect the scope input on the signal that is to be checked. For signals UNI1 and UNI2, sync on INT "+" while for ULAMN, sync on INT "-".

2) - Run the Semi Manual Test diagnostic until the CTW 101 Operator panel END of BUFFER indicator starts pulsating. See Note on the following page.

3) - To obtain correct UNI1 and UNI2 adjustments, appropriately vary the pertinent one-shot adjust pot while for correct setting of ULAMN, vary the one-shot capacitance.
For this latter adjustment, it is useful to remember that the capacitors are located on PWB ULUN-A positions C1 to C8 and that their positive leads must be soldered on the innermost PWB run pad (in other words, facing the centre of the PWB).

Note

END of BUFFER indicator pulsations may also be obtained by first grounding D-03-07 to enable recycling of the one-shots, then grounding F-18-04 to trigger the one-shots and therefore removing this last grounding.

4 - FINAL CHECKS

- None.

ROUTINE : 4.2

NAME : MEMORY ONE-SHOTS TIMING

ELEMENTARI UNIT : MEM 160

DURATION : 1 hr
PREREQUISITES : None

1 - NEEDED MATERIAL

- Screwdriver, 2.5 mm blade	P.N. 4355475 P
- CTW 101 Functional Test diagnostic	" 4T4720900
- Oscilloscope	

2 - PURPOSE

- To obtain correct duration (signal length) of the below listed signals :
  - . SILE1 - DULE command
  - . DULE1 - Read current timing
  - . TEO1 - DUIN command
  - . DUIN1 - Inhibit current timing
  - . SISI1 - DUSI command
  - . DUSI1 - Write current timing
  - . TIBU1 - Comparison Strobe
  - . TEO21 - Count clock
  - . TEO31 - Recycle Strobe.

3 - PROCEDURE

The one-shot timings must correspond to the figures shown in the following table :

SIGNAL	TIME nsecs	TOL. %	ROW	PWB	PIN	POT
SILE1	1490	±3	A	13	01	Upper
DULE1	1025	±3	A	12	01	Upper
TE01	1680	±3	A	9	01	Upper
DUIN1	1475	±3	A	9	10	Lower
SISI1	1490	±3	A	13	10	Lower
DUSI1	1025	±3	A	12	10	Lower
TIBU1	1800	±3	A	8	01	Upper
TE021	1545	±3	A	11	01	Upper
TE031	2065	±3	A	11	10	Lower

1) - Connect the scope input on the signal that is to be checked. Sync on INT "+".

2) - Recycle on Functional Test diagnostic test 14 (trip CPU console switch 1).

3) - To obtain correct adjustment, appropriately vary the involved one-shot adjust pot.

4 - FINAL CHECKS

- None.

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CONSOLE TYPEWRITER SUBSYSTEM

CTW 101

Maintenance

A Field Engineering
Publication

4.111.4.001.0/A

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4.1. CONTROLLER ONE-SHOTS TIMING " 9
4.2. MEMORY ONE-SHOTS TIMING " 12

1. OPERATOR TASKS

Note

Refer to Teletype Corp. Bulletin 273 B or 310 B - Vol. 1.

2. MAINTENANCE CHECKS

Note

Refer to both Teletype Corp. Bulletin 273 B or 310 B - Volumes 1 and 2 - and HISI Maintenance Schedule Type G code No 4.014.4.647. /A.

3. CLEANING AND LUBRICATION

Note

Refer to both Teletype Corp. Bulletin 273 B or 310 B - Volume 1 - and HISI Lubrication Plan code No 4.014.4.648. /A.

4. ADJUSTMENTS

(Controller and Device Oriented Electronics)

ROUTINE : 4.1

NAME : CONTROLLER ONE-SHOTS TIMING

ELEMENTARY UNIT : GIT 100

DURATION : 1 hr
PREREQUISITES : None

1 - NEEDED MATERIAL

- Screwdriver, 2.5 mm blade	P.N. 4355475 P
- Soldering iron	" 7144451 X
- CTW 101 Functional Test diagnostic	" 4T4720900
- CTW 101 Semi Manual Test diagnostic	" 4T4721000
- Oscilloscope	

2 - PURPOSE

- To obtain correct duration (signal length) of the below listed signals :

. TURI	- Delays triggering of TU02
. TU02	- Command or character strobe from CPU
. MUTE	- Character recognition pulses
. UNA1 . UNA2	- 20 msec clock interrupt generators
. UNI1	- UNI2 command
. UNI2	- 350 ms END of BUFFER pulsation timings
. ULAMN	- Lights-up the END of BUFFER indicator on the CTW operator panel.

3 - PROCEDURE

The one-shot timings must correspond to the figures shown in the following table :

SIGNAL	TIME	TOL %	ROW	PWB	PWB PIN	POT
TURI	2 µs	±5	D	02	01	Upper
TU02	1.2 µs	±5	D	02	10	Lower
MUTE	1.14ms	±2	D	06	16	
UNA1	10 ms	±5	D	04	01	Upper
UNA2	10 ms	±5	D	04	10	Lower
UNI1	1 µs	±5	D	03	01	Upper
UNI2	2.5 ms	±5	D	03	10	Lower
ULAMN	350 ms	±5	D	05	14	*

* Slow recovery one-shot (ULLN-A) without adjust pot.

3.1. - TURI · TUO2 · MUTE · UNA1 · UNA2 Timing

1) - Connect the scope input on the signal that is to be checked. Sync on INT "+".

2) - Set up both the system reader and printer for a CTW 101 Functional Test diagnostic run through.

3) - To check duration of :

- TURI, TUO2 : recycle on diagnostic test 1
- MUTE : recycle on diagnostic test 5
- UNA1, UNA2 : recycle on diagnostic test 9

(To recycle on a given test, trip switch 1 on the CPU console).

4) - Appropriately vary the involved one-shot adjust pot to obtain the correct setting.

3.2. - UNI1 · UNI2 · ULAMN Timing

1) - Connect the scope input on the signal that is to be checked. For signals UNI1 and UNI2, sync on INT "+" while for ULAMN, sync on INT "-".

2) - Run the Semi Manual Test diagnostic until the CTW 101 Operator panel END of BUFFER indicator starts pulsating. See Note on the following page.

3) - To obtain correct UNI1 and UNI2 adjustments, appropriately vary the pertinent one-shot adjust pot while for correct setting of ULAMN, vary the one-shot capacitance.
For this latter adjustment, it is useful to remember that the capacitors are located on PWB ULUN-A positions C1 to C8 and that their positive leads must be soldered on the innermost PWB run pad (in other words, facing the centre of the PWB).

Note

END of BUFFER indicator pulsations may also be obtained by first grounding D-03-07 to enable recycling of the one-shots, then grounding F-18-04 to trigger the one-shots and therefore removing this last grounding.

4 - FINAL CHECKS

- None.

ROUTINE : **4.2**

NAME : MEMORY ONE-SHOTS TIMING

ELEMENTARI UNIT : MEM 160

DURATION : 1 hr
PREREQUISITES : None

1 - NEEDED MATERIAL

- Screwdriver, 2.5 mm blade	P.N. 4355475 P
- CTW 101 Functional Test diagnostic	" 4T4720900
- Oscilloscope	

2 - PURPOSE

- To obtain correct duration (signal length) of the below listed signals :
  - . SILE1 - DULE command
  - . DULE1 - Read current timing
  - . TE01 - DUIN command
  - . DUIN1 - Inhibit current timing
  - . SISI1 - DUSI command
  - . DUSI1 - Write current timing
  - . TIBU1 - Comparison Strobe
  - . TE021 - Count clock
  - . TE031 - Recycle Strobe.

3 - PROCEDURE

The one-shot timings must correspond to the figures shown in the following table :

SIGNAL	TIME nsecs	TOL. %	ROW	PWB	PIN	POT
SILE1	1490	±3	A	13	01	Upper
DULE1	1025	±3	A	12	01	Upper
TE01	1680	±3	A	9	01	Upper
DUIN1	1475	±3	A	9	10	Lower
SISI1	1490	±3	A	13	10	Lower
DUSI1	1025	±3	A	12	10	Lower
TIBU1	1800	±3	A	8	01	Upper
TE021	1545	±3	A	11	01	Upper
TE031	2065	±3	A	11	10	Lower

1) - Connect the scope input on the signal that is to be checked. Sync on INT "+".

2) - Recycle on Functional Test diagnostic test 14 (trip CPU console switch 1).

3) - To obtain correct adjustment, appropriately vary the involved one-shot adjust pot.

4 - FINAL CHECKS

- None.

PREVENTIVE MAINT. LOG

CTW 101
MSC 220(M33)

YEAR MACHINE TYPE and SERIAL No

MAINTENANCE TYPE **G**
Approx. duration 1.5 h.h/10

FREQ.	3 months	6 months
SHIFTS	3	0-1-2

SCHED. DATE	EFFECT. DATE	EFFECT. DURAT.	ENGR.

PIECE	REPL. FREQ. (hours)	SCHEDULED REPLACEMENTS					
VAR 640 fan filters (GTW 101)	6 months						

DATE	NOTES

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MAINTENANCE SCHEDULE TYPE G

CTW 101
MSC220(M33)

MACHINE OFF OPERATIONS

1. - SET-UP

a- Read the notes listed on the Preventive Maintenance Log.

b- Remove or raise the top cover.

2. - CLEANING

Proceed to duly clean :

a- The entire mechanics unit (particularly near the motor fan). Do not air blast clean.

b- The carriage return piston and dashpot.

c- The distributor, using a slightly alcohol dampened cloth.

d- The typewheel and print hammer.

3. - SCHEDULED REPLACEMENTS

(Only valid for CTW 101) In accordance with the Preventive Maintenance Log, proceed to replace the VAR 640 fan filters.

4. - LUBRICATION

Refer to appropriate Plan - Code No 4.014.4.648./A.

5. - CHECKS

a- For correct tension and general state of wear of the motor belt.

b- Typewheel guide bearings play.

c- Print hammer state of wear (rubber portion).

d- Clutches stop pawls.

e- Distribution and brushes state of wear.

MACHINE ON OPERATIONS

6. - FUNCTIONAL TESTS

- CTW 101

a- With the subsystem in the STAND-BY status, depress and punch the 63 keyboard character keys. Feed the so obtained paper tape several times through thetape reader and check the print.

b- Run the Isolation Test diagnostic (card deck Code No 4720810 K).

- MSC 220

c- Run through the CONSOM diagnostic.

7. - FINAL OPERATIONS

a- Replace or lower the top cover.

b- Fill-in the Preventive Maint. Log and appropriate Service Report, if required.

LUBRICATION PLAN

CTW 101
MSC 220(M33)

LUBRICATION TYPES		
	① Extra light oil (spray)	HISI P.N.0491025 A
	③ Medium oil	HISI P.N.0491020 G
	$\boxed{1}$ Multi purpose grease	HISI P.N.0491014 0

① EXTRA LIGHT OIL (SPRAY)

- Proceed to lubricate all possible parts of the mechanics unit AVOIDING the following :
  - a- keyboard
  - b- solenoid armature and cores
  - c- belts and pulleys
  - d- distributor and brushes
  - e- typewheel and print hammer
  - f- platten, paper guides and deflectors
  - g- tape guides, levers and arms
  - h- tape reader *

- LUBRICATE
  - a- motor bearings (lube holes)
  - b- clutches shaft bearings (see note)
  - c- carriage drive arm eccentric cams
  - d- typewheel mechanicsm guides and pivots
  - e- stripper levers linkage points
  - f- line space mechanism linkage points
  - g- carriage return linkage points
  - h- tape punch pins *
  - i- tape reader linkage points and pivots. *

③ MEDIUM OIL

- Thoroughly soak the felt washers physically located on the :
  - a- carriage drive bail
  - b- typewheel shaft
  - c- print hammer shaft
  - d- ribbon feed pawl
  - e- stripper drive lever
  - f- function drive arm
  - g- code bar reset bail shaft
  - h- clutches
  - i-tape punch lever pivot *
  - l- tape punch sensing levers shaft. *

$\boxed{1}$ MULTI-PURPOSE OIL

- LUBRICATE
  - a- gears
  - b- typewheel carrige bearings
  - c- selector clutch camming surfaces
  - d- clutch shaft cam followers
  - e- carriage return ratchet
  - f- selector clutch and trip magnet armatures engaging surfaces
  - g- armature pivot shaft engaging surfaces *
  - h- tape reader detent lever - control detent - lever shaft engaging surfaces *
  - i- keyboard contact bail to contact wires mating surfaces. *

Note

Only lightly lubricate the bearing on the distributor shaft so as to avoid oil migrating on the distributor.

* = Only valid for CTW 101.

PARTS

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CTW 101

TELESCRIVENTE DI CONSOLE

Catalogo parti di ricambio

Edito a cura della
Sezione Assistenza Tecnica

4.111.5.001.0

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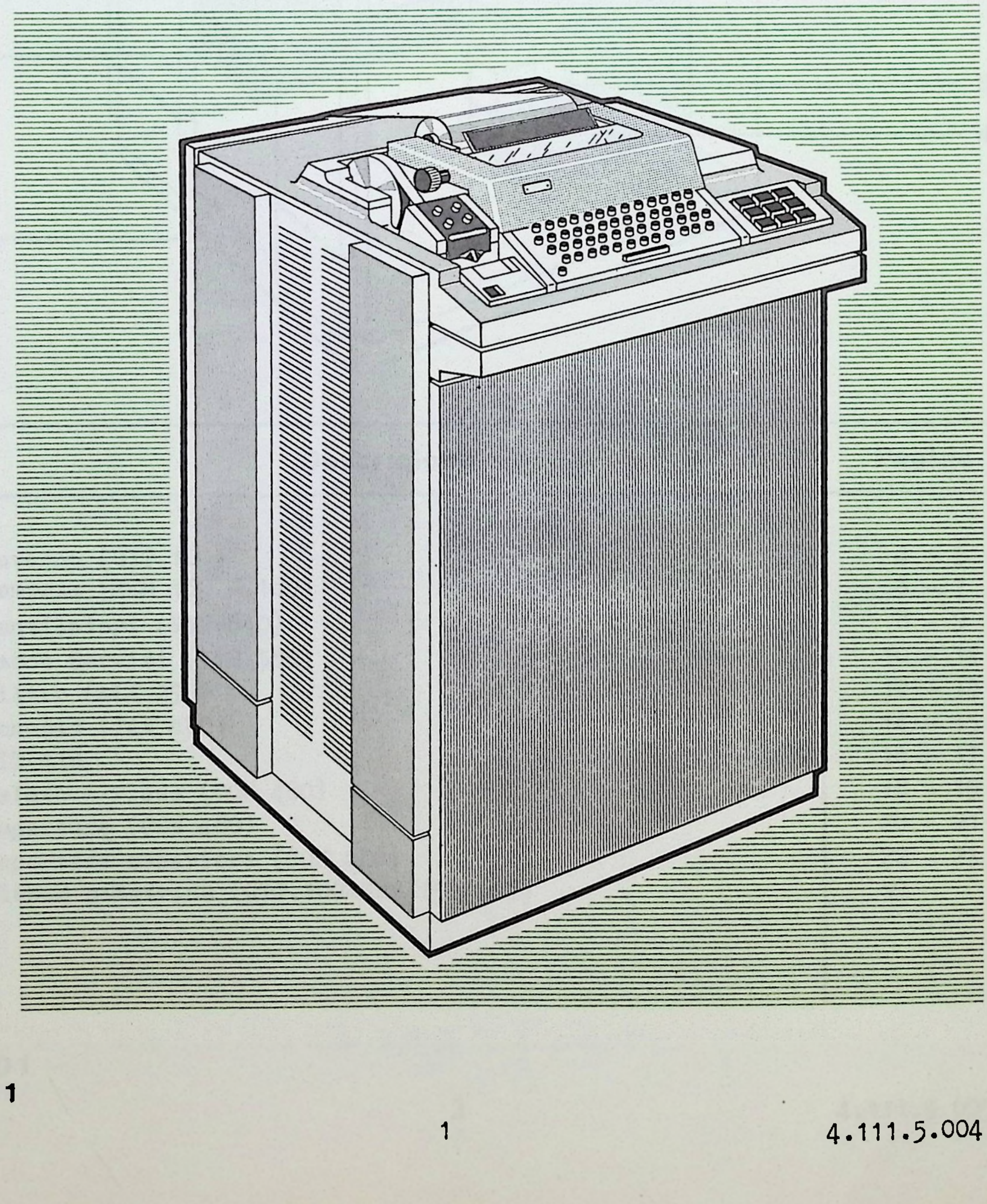
CTW 101 - TELESCRIVENTE DI CONSOLE



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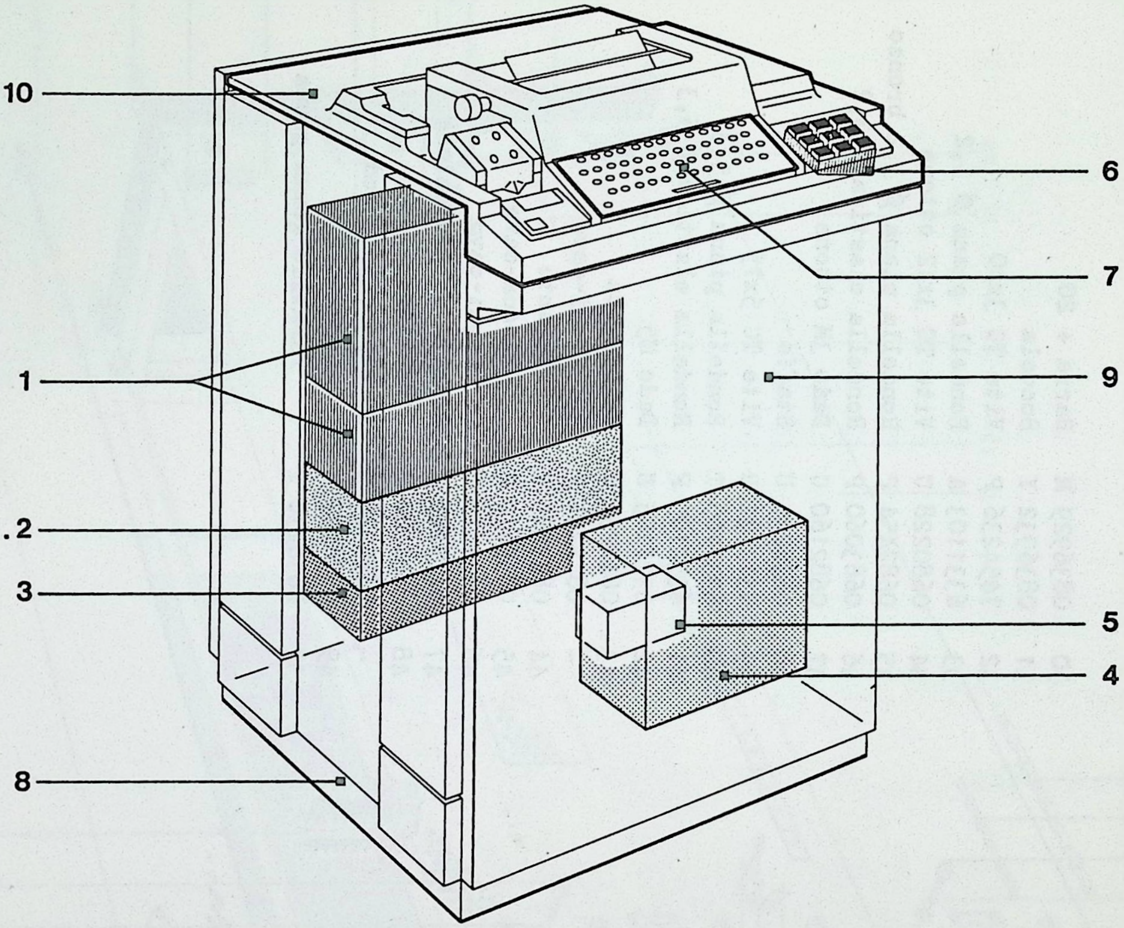

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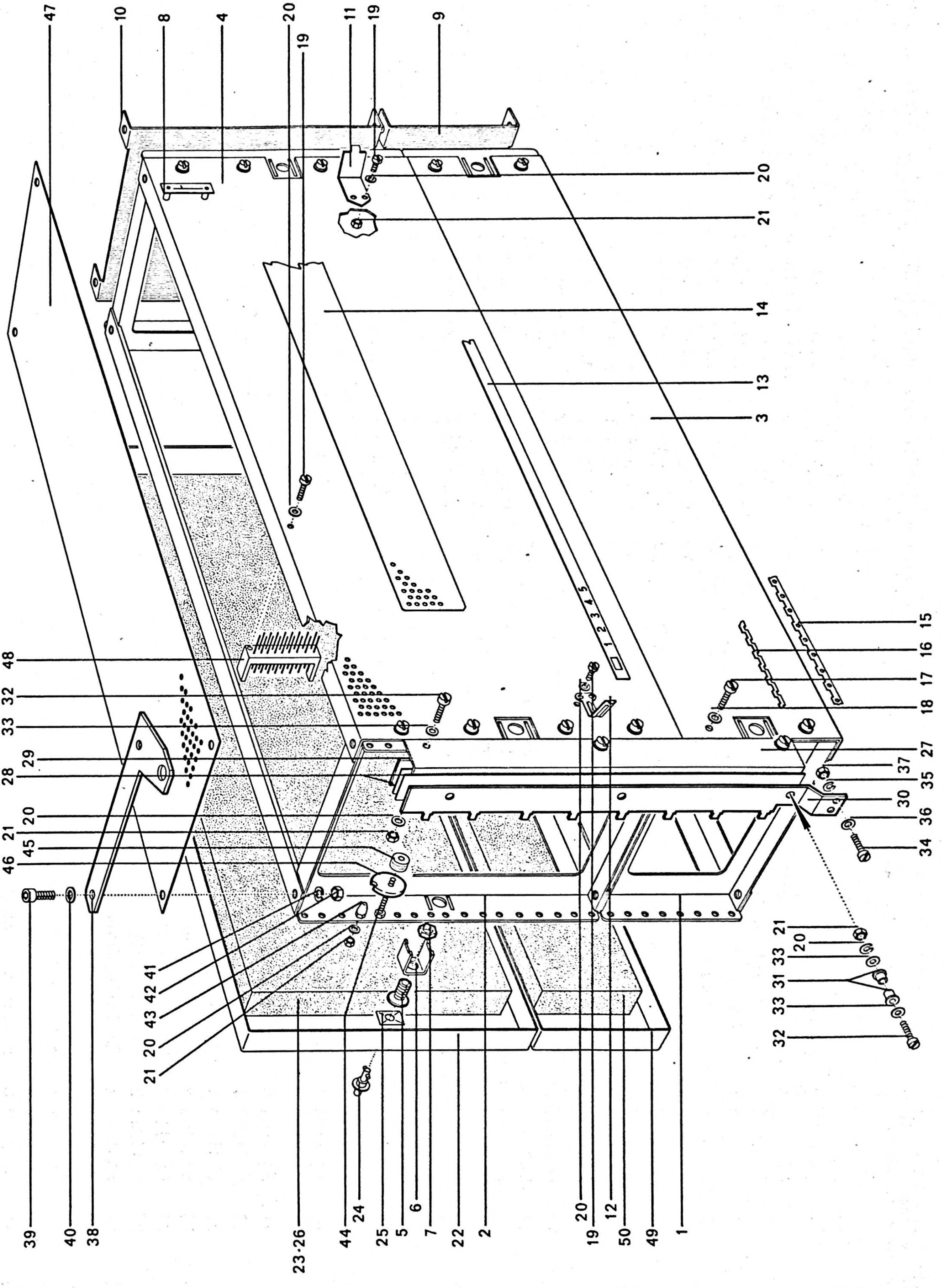
1	0676218	Y	Telaio ½ mod.
2	0676214	X	Telaio 1 mod.
3	0676224	Y	Lamiera forata ½ mod.
4	0676217	B	Lamiera forata 1 mod.
-	0835484	X	AG. Supp. coperchio
5	0834663	Y	Ricettacolo Fastener
6	0835132	C	Supporto
7	0834662	U	Dado Fastener
8	0834478	K	Distanziatore
9	0839927	R	Schermo laterale ½ mod.
10	0839933	R	Schermo laterale 1 mod.
11	0834473	S	Supp. balestra DX
12	0834474	P	Supp. balestra SX
13	0837894	Z	Riga numerata
14	0834009	V	Nastro isolante
15	0834008	Z	Bandella di massa
16	0834007	C	Bandella di alimentazione
17	6311242	W	Vite TC 4x8
18	6332104	B	Rond. elastica ø 4,3
19	6311230	Q	Vite TC 3x6
20	6332103	N	Rondella elastica ø 3,2
21	6321103	H	Dado M3
-	0676226	G	AG. Coperchio 1 mod.
22	0674222	X	Coperchio
23	0676227	C	Pannello gomma piuma
24	0834661	Q	Pulsante Fastener
25	0834665	R	Staffa elastica
26	3151925	K	Collante
27	0836926	Y	Supporto barre
28	0836927	U	Bandella isolante
29	0836928	R	Barra massa
30	0836929	M	Barra + 20
31	0836932	Y	Boccola
32	7454236	P	Vite TC 3x10
33	6331103	A	Rondella piana ø 3,2
34	0680228	U	Vite TC 3x12 ottone
35	0682454	P	Rondella piana ø 3,2 bronzo
36	0683060	P	Rondella elastica ø 3,2
37	0682160	C	Dado 3M ottone
38	0676225	U	Staffa
39	6313132	B	Vite TC 5x15
40	6331105	T	Rondella piana ø 5,3
41	6332105	F	Rondella elastica ø 5,3
42	6321105	S	Dado M5
43	0842252	T	Colonnetta
-	0842251	P	AG. Premi-cavo
44	0839609	V	Tirante
45	0839610	P	Blocca-cavo
46	0839612	U	Premi-cavo
47	0675228	M	Piastra di protezione
48	0834000	S	Connettore
-	0676228	Z	AG coperchio ½ mod.
49	0676229	V	Coperchio
50	0676230	T	Pannello gomma piuma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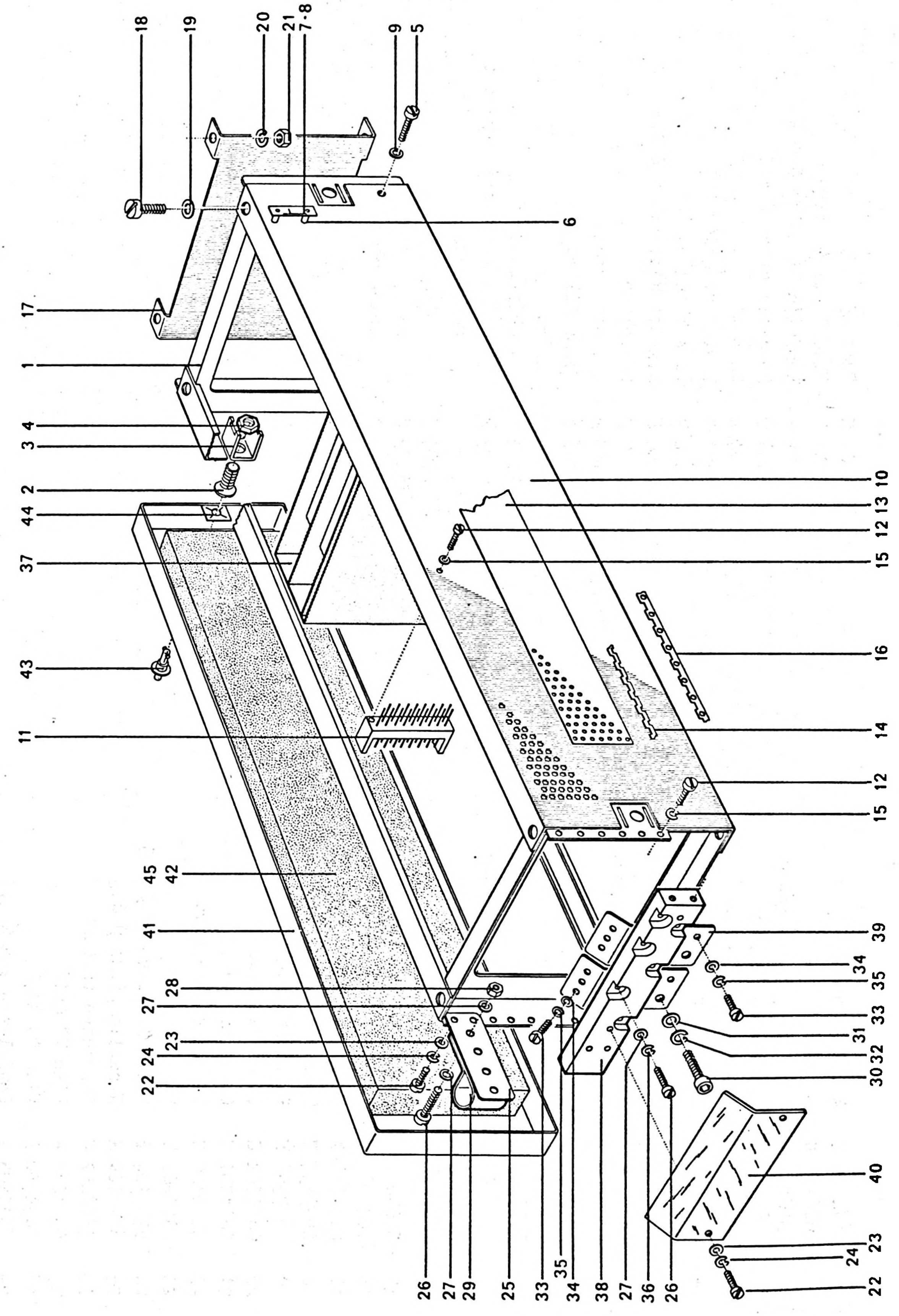
1	0676218	Y	Assieme telaio
–	0835484	X	AG. Supporto coperchio
2	0834663	Y	Ricettacolo Fastener
3	0835132	C	Supporto
4	0834662	U	Dado Fastener
5	6311242	W	Vite TC 4x8
6	0834478	K	Distanziatore
7	0834397	W	Targhetta U.E.
8	0834416	U	Etichetta codice
9	6332104	B	Rondella elastica ø 4,3
10	0676223	B	Piastra forata
11	0834000	S	Connettore
12	6311230	Q	Vite TC 3x6
13	0834009	V	Nastro isolante
14	0834007	C	Bandella di alimentazione
15	6332103	N	Rondella elastica ø 3,2
16	0834008	Z	Bandella di massa
17	0839927	R	Schermo laterale
18	6313132	B	Vite TC 5x15
19	6331105	T	Rondella piana ø 5,3
20	6332105	F	Rondella elastica ø 5,3
21	6321105	S	Dado M5
22	6311232	V	Vite TC 3x10
23	6331103	A	Rondella piana ø 3,2
24	6332103	N	Rondella elastica ø 3,2
25	0819131	E	Squadretta reggicavo
26	6311244	P	Vite TC 4x12
27	6331104	X	Rondella piana ø 4,3
28	6321104	W	Dado M4
29	5618054	V	Serracavo tipo 2
30	0680311	X	Vite TC C.E. 8x15
31	0682560	L	Rondella piana ø 8,4
32	0683131	E	Rondella elastica ø 8,4
33	0680534	D	Vite TC 4x10 ottone
34	0682456	X	Rondella piana ø 4,3 ottone
35	0683086	F	Rondella elastica ø 4,3
36	6332104	B	Rondella elastica ø 4,3
37	0645390	U	Memoria completa
38	0836930	K	Traversino
39	0837742	G	Piastrina
40	0836931	L	Protezione
–	0676228	Z	AG. Coperchio ½ mod.
41	0676229	V	Coperchio
42	0676230	T	Pannello
43	0834661	Q	Pulsante Fastener
44	0834665	R	Staffa elastica
45	3151925	K	Collante bostik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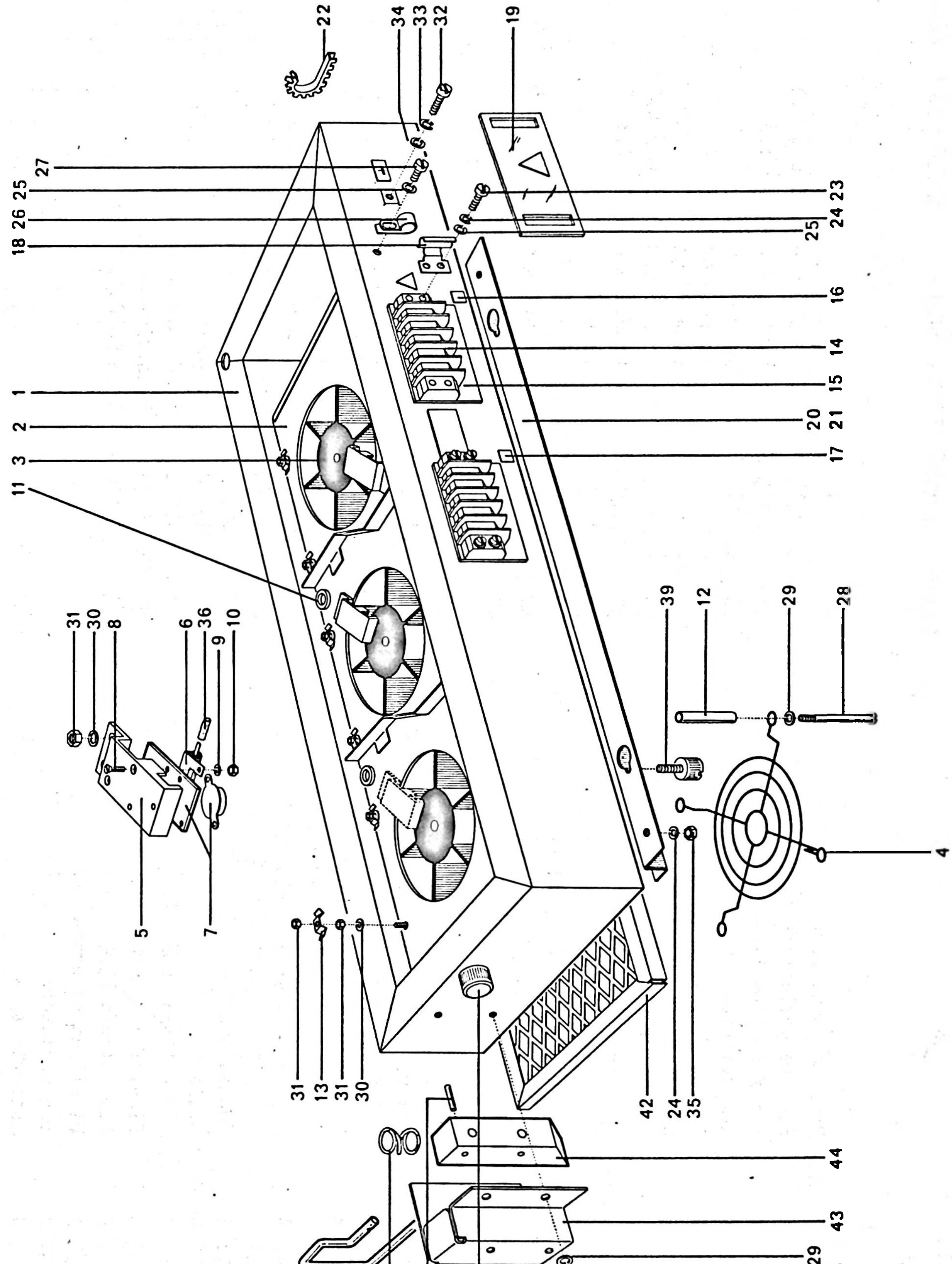
-	0674900	T	AG. Telaio
1	0676189	N	Telaio
2	0676190	F	Sostegno ventilatori
3	0001614	C	Ventilatore Boxer
4	5541340	N	Griglia ventilatore
-	0842609	G	AG. Protezione ventilatore
5	0837664	Z	Scatola di protezione
6	4962961	R	Resist. sage 70Ω 8W 3%
7	0842638	T	Resist. di protezione
8	6312725	F	Vite TS 2MAx8
9	0683542	T	Rondella elastica ∅ 2,2
10	0682865	D	Dado 2MA
11	0001876	F	Passacavo
12	0838723	X	Distanziatore
13	0837215	Q	Molla blocca dadi
14	5612540	D	Morsettiera Rhodex
15	0000867	H	Piastrina numerata
16	0831062	U	Targhetta P20
17	0831063	Y	Targhetta P20A
18	0839653	U	Molletta
19	0839356	K	Piastrina isolante
20	0674902	G	Guida sinistra
21	0674901	U	Guida destra
22	5618320	N	Listello passacavo
23	6311247	T	Vite TC 4x20
24	6332104	B	Rondella elastica ∅ 4,3
25	6331104	X	Rondella piana ∅ 4,3
26	5618052	C	Serracavo Looping
27	6311244	P	Vite TC 4x12
28	7454750	B	Vite TC 3x50
29	6331103	A	Rondella piana ∅ 3,2
30	6332103	N	Rondella elastica ∅ 3,2
31	6321103	H	Dado M3
32	0680534	D	Vite TC 4x10 ottone
33	0683081	S	Rondella elastica ∅ 4,3
34	0685436	T	Rondella piana ∅ 4,3
35	6321104	W	Dado M4
36	5621697	K	Manicotto Helavia
37	6311242	W	Vite TC 4x8
38	6332304	F	Rosetta dentellata ∅ 4,3
39	0674159	N	Nottolino
40	0674140	M	Nottolino comando
41	0674146	Y	Ferma filtro
42	3361209	U	Filtro
-	0676192	L	AG. Chiavistello
43	0676203	M	Contenitore chiavistello
44	0676204	A	Chiavistello
45	0676205	E	Molla
46	0676206	J	Maniglia
47	0005192	J	Spina elastica 2x14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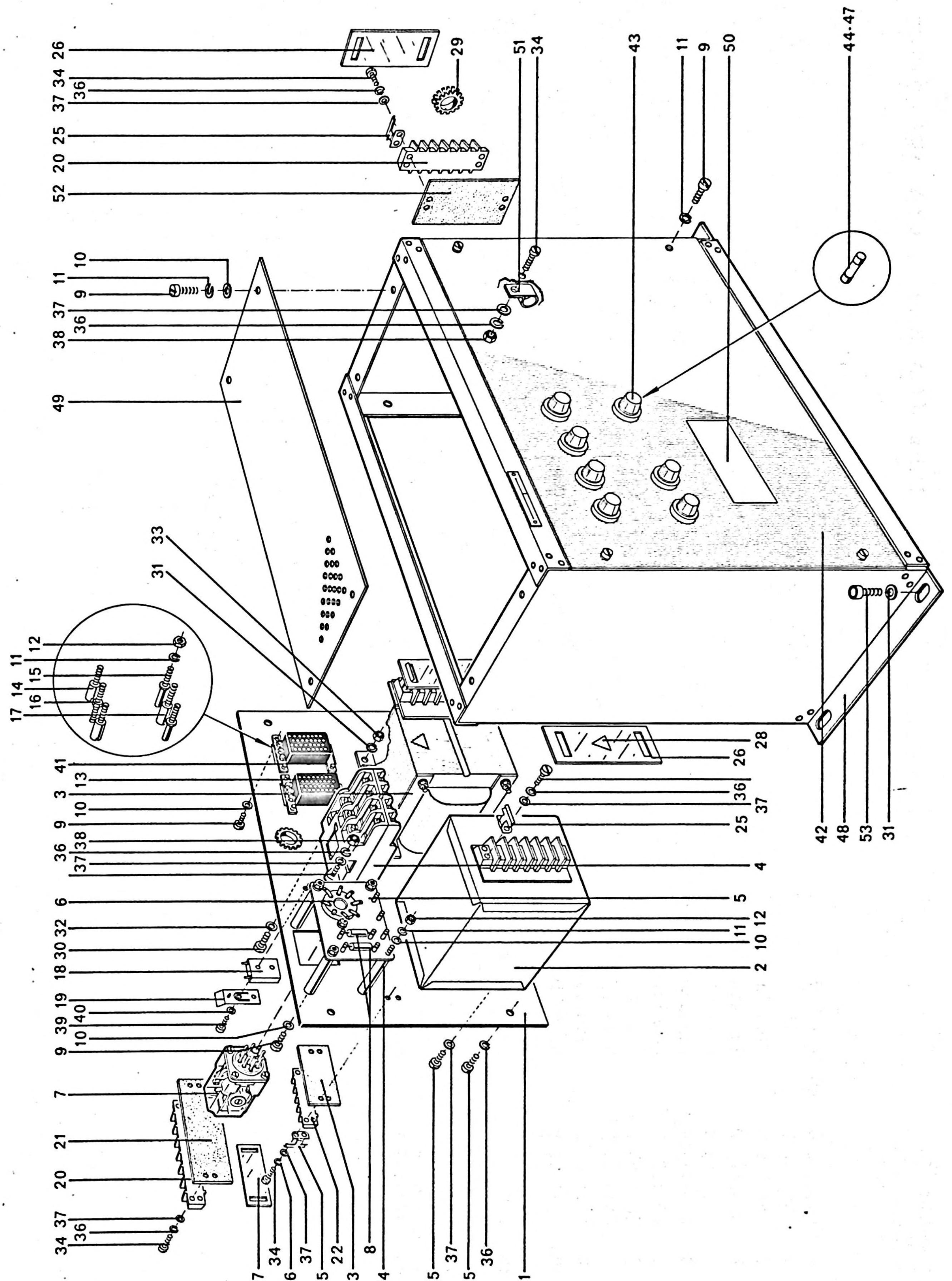
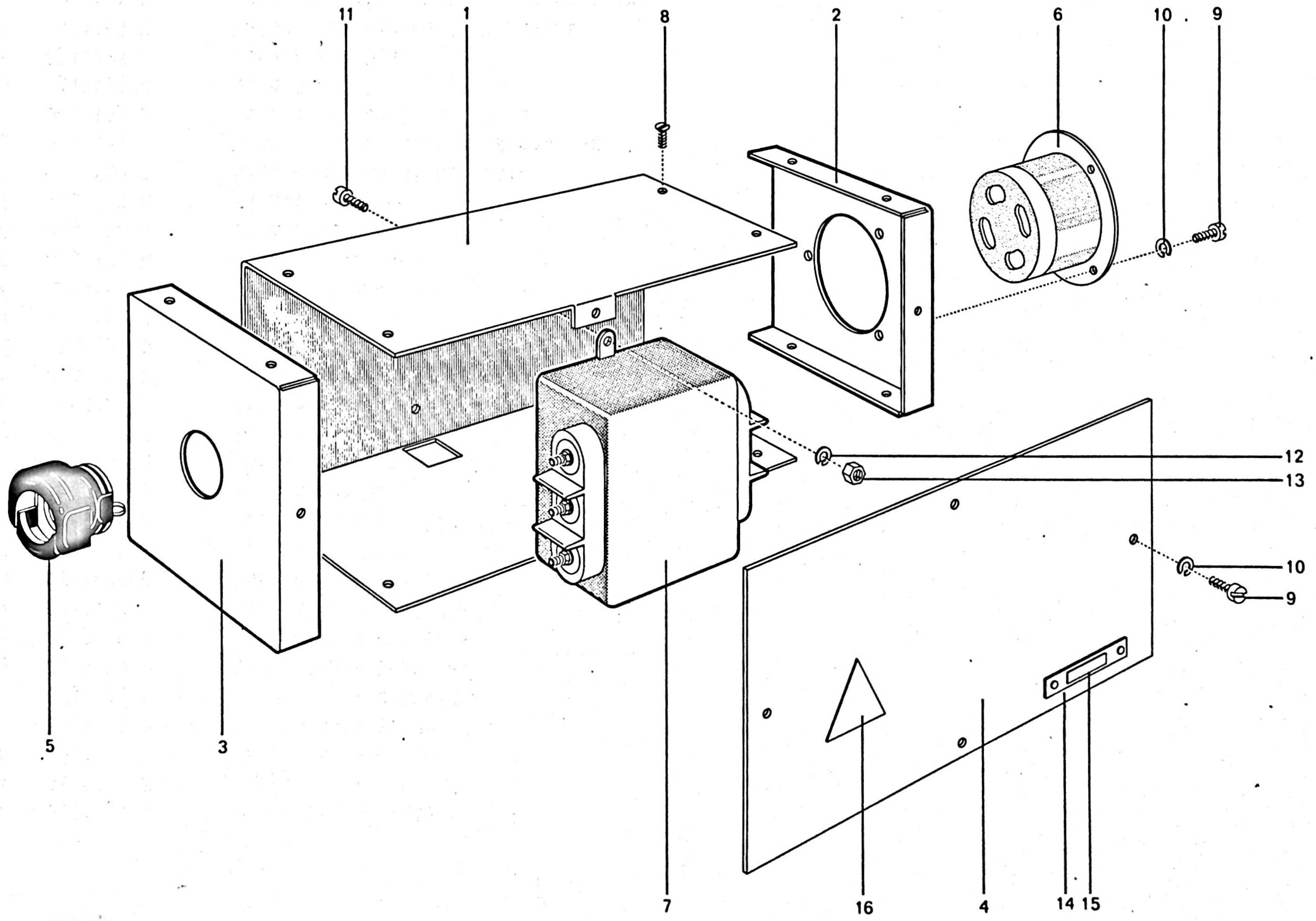
-	0842986	E	AG. Piastra posteriore
1	0836918	Q	Piastra posteriore
2	0001315	S	Trasformatore T4000/22/8
3	5472101	G	Autotrasformatore 21008.A
4	0001822	H	Teleruttore
-	0842984	W	AP. Piastrina
5	0836925	L	Piastrina
6	0001663	L	Zoccolo Octal
7	0001641	A	Relè Potter
8	4962958	N	Resistenza Seci 82 Ω
9	6311231	R	Vite TC 3x8
10	6331103	A	Rondella piana Ø 3,2
11	6332103	N	Rondella elastica Ø 3,2
12	6321103	H	Dado M3
-	0842491	F	AP. Connettore 34 C. A
13	0000730	H	Blocchetto 34 C.
14	0001103	Q	Guida d'angolo femmina
15	0001102	L	Guida d'angolo maschio
16	0001123	E	Maschio centrale di racc.
17	0001124	T	Femmina centrale di racc.
18	0005176	H	Connettore AMP
19	0689526	L	Molletta
20	5612447	M	Morsettiera K606
21	5612999	E	Piastrina numerata
22	0000849	Y	Morsettiera K504
23	0836952	S	Piastrina numerata
24	0838137	M	Distanziatore
25	0839653	U	Molletta tp A
26	0839357	P	Piastrina isolante
27	0839337	M	Piastrina isolante
28	3543104	P	Targhetta A.T.
29	5618320	N	Listello passacavo
30	6311257	U	Vite TC 5x12
31	6331105	T	Rondella elastica Ø 5,3
32	6332105	F	Rondella piana Ø 5,3
33	6321105	S	Dado M5
34	6311245	K	Vite TC 4x14
35	6311242	W	Vite TC 4x8
36	6332104	B	Rondella elastica Ø 4,3
37	6331104	X	Rondella piana Ø 4,3
38	6321104	W	Dado M4
39	7454708	R	Vite TC 2,6x10
40	0683041	N	Rondella elastica Ø 2,8
41	0838039	M	Barretta di fissaggio
-	0842985	S	AG. Piastra anteriore
42	0836919	L	Piastra
43	0001238	X	Portafusibile
44	0001262	G	Fusibile 3 A.
45	0001218	V	Fusibile 0,5 A.
46	0001259	V	Fusibile 1 A.
47	0001244	X	Fusibile ritardato 3 A.
48	0836923	T	Gruppo scatola
49	0836915	K	Piastra forata
50	3443120	F	Targhetta
51	5618052	C	Serracavo Looping
52	0836953	W	Piastrina numerata
53	6313130	V	Vite TC C.E. 5x10

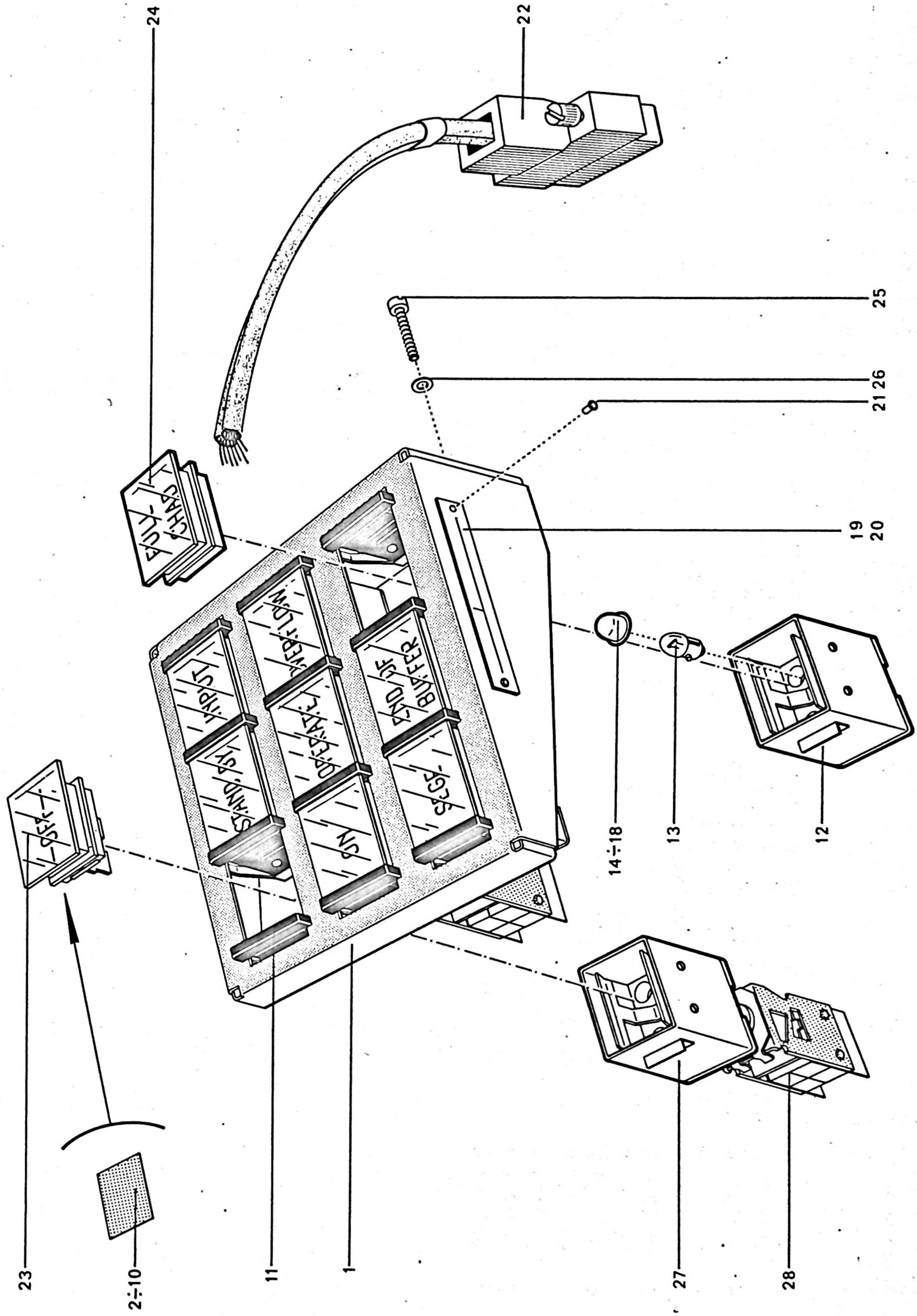

44-47

Filtro (ALI 290) CTW 101 catalogo

-	0643394	H	AG. ALI 290
1	0819152	L	Fondo
2	0837774	U	Testata DX
3	0837773	F	Testata SX
4	0839165	C	Coperchio
5	0001373	F	Passacavo
6	0001292	K	Connettore
7	5427068	F	Filtro
8	6312733	P	Vite TS 3x8
9	6311243	S	Vite TC 4x10
10	6332104	B	Rondella Elast. Ø 4,3
11	0680534	D	Vite TC 4x10 ottone
12	0683081	S	Rondella elastica Ø 4,3 B8
13	0682260	E	Dado M4 ottone
14	0834397	W	Targhetta U.E.
15	0834416	U	Etichetta codice
16	3543106	X	Targhetta

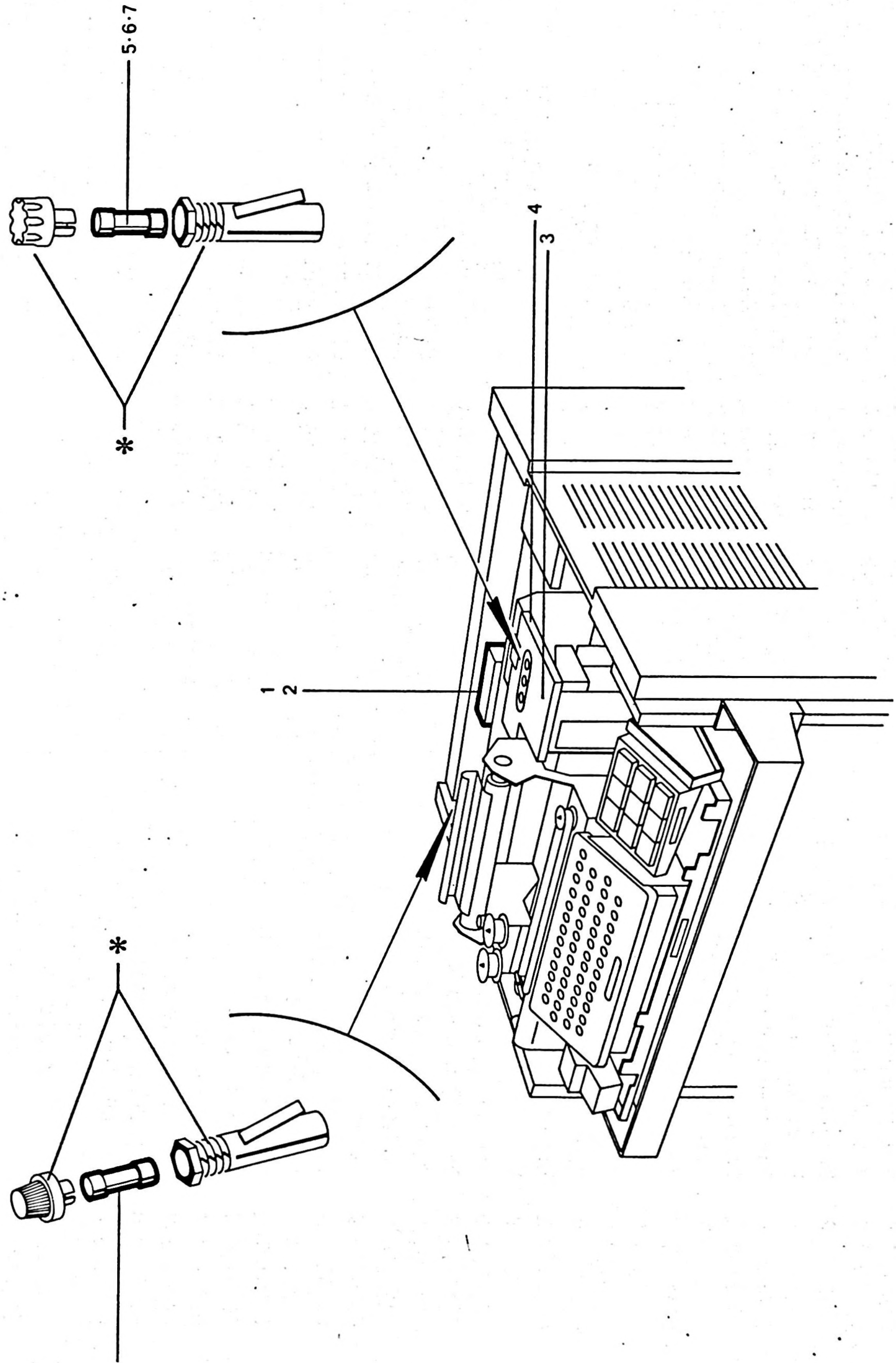


-	0643377 B	AG.	Consolle completa
1	0676287 J		Supp. tasti
2	0831797 H		Targhetta = OFF =
3	0831792 C		Targhetta = STAND BY =
4	0831791 Y		Targhetta = OPERATE =
5	0819130 D		Targhetta = INPUT =
6	0819129 F		Targhetta = OVERFLOW =
7	0819128 B		Targhetta = FULL CHAD =
8	0831805 P		Targhetta = ON =
9	0819126 J		Targhetta = SEGE =
10	0819127 N		Targhetta = END OF BUFFER =
11	5141504 J		Fianchetto nero
12	0001154 W		Unità indicatrici 4 lampadini
13	0001823 D		Lampadini
14	0001161 S		Filtro giallo
15	0001160 Z		Filtro rosso
16	0001511 D		Filtro bianco
17	0001162 E		Filtro vèrde
18	0001163 A		Filtro bleu
19	0834397 W		Targhetta U.E.
20	0834416 U		Targhetta codice
21	1925110 E		Ribattino
22	0800880 Z		Cavo completo di connett.
23	0001156 E		Piastrina completa a 2 sezioni
24	0001155 S		Piastrina completa unica
25	6313134 U		Vite 5x20
26	6331105 T		Rondella ∅ 5,3
27	0001149 S		Unità indicatrice 4 lampadini
28	0001151 Z		Unità ad azione momentanea bipolare


14÷18
2÷10
INPUT
OVERFLOW
END OF BUFFER
STAND. BY
OPERATE
ON
OFF

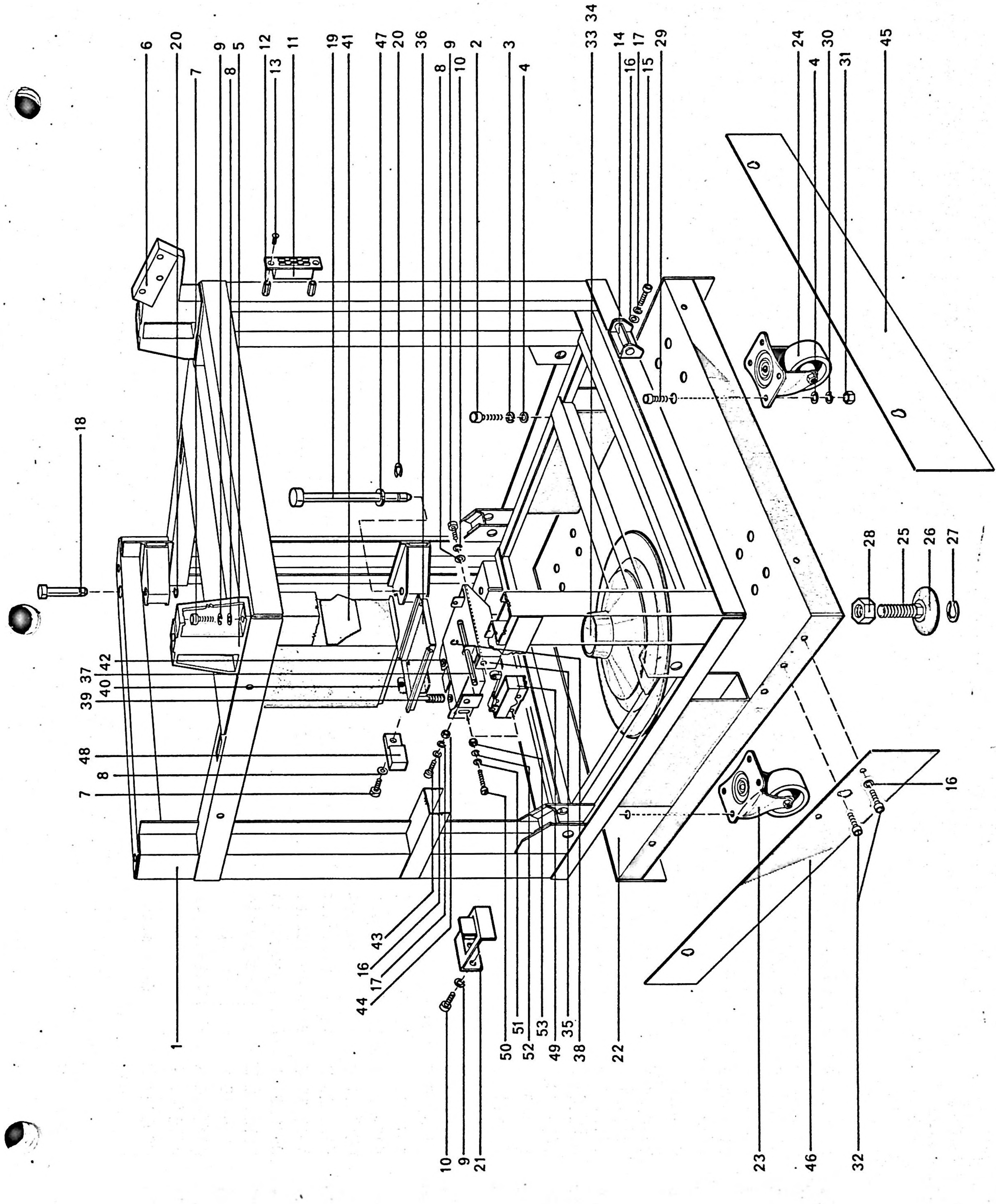
-	0643202 R	AG. MIT 410 50 Hz Mod. A (senza lettore automatico)
-	0643380 A	AG. MIT 410 60 Hz " L (" " ")
-	0643379 U	AG. MIT 410 50 Hz " B (con " ")
-	0643381 B	AG. MIT 410 60 Hz " M (" " ")
1	0676284 E	Supporto piastrina
2	0676279 S	Protezione
3	0676288 F	Protezione fusibili
4	0001858 W	Listello dentellato
5	0001218 V	Fusibile 0,5 A - 250V
6	5375110 F	Fusibile 3/8 A - 250V
7	0001244 V	Fusibile 3 A - 125V
8	0001243 X	Fusibile 2 A - 125V

* Vedere il codice sul catalogo Teletype.

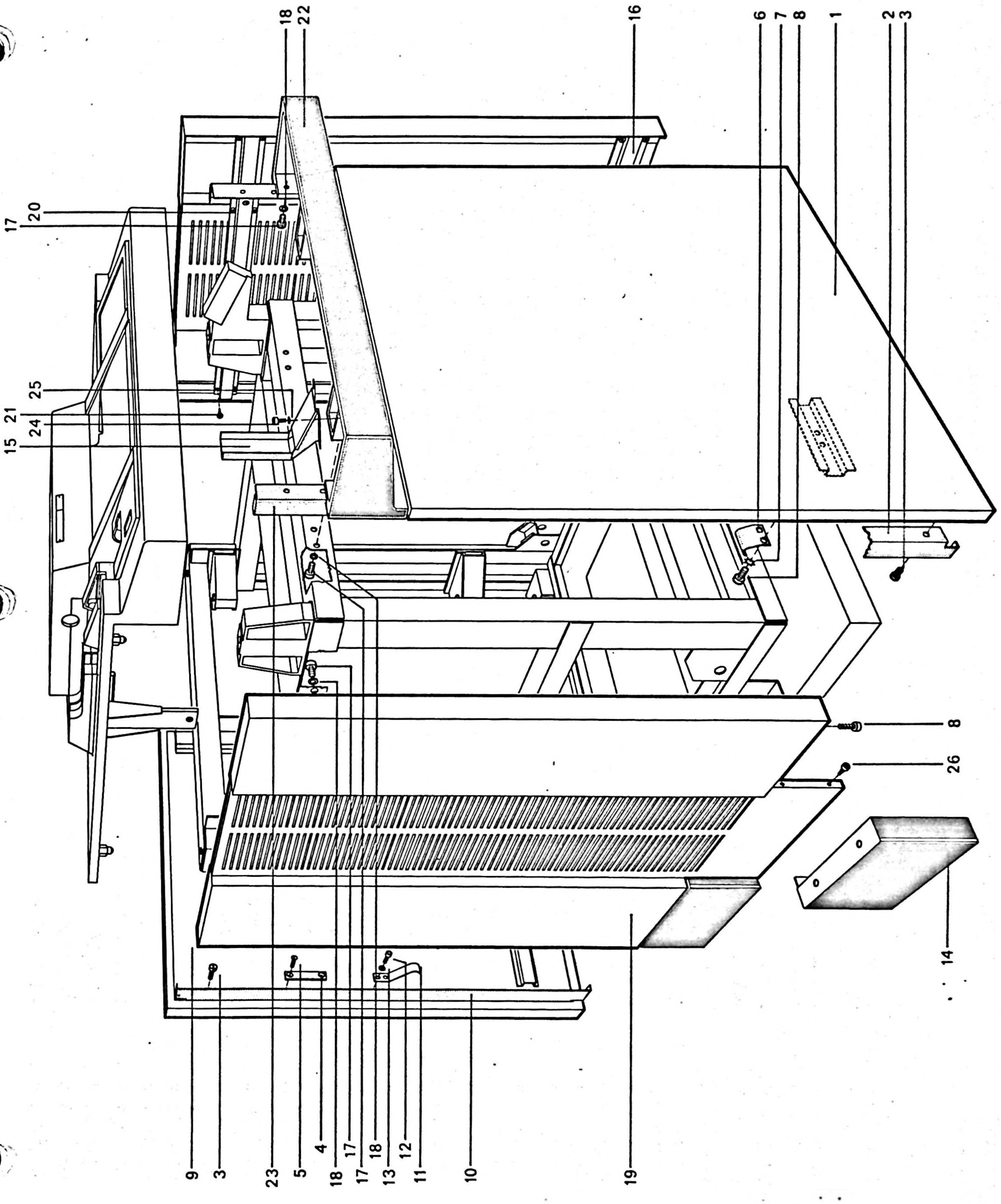

5·6·7
*
*

Telaio - Piede (CON 480)

1	0676158	S	Gruppo struttura
2	6313148	W	Vite TC C.E. M6x14
3	6332306	P	Rosetta dentata
4	6331106	F	Rosetta piana
5	0676160	U	Supporto carter SX
6	0676162	H	Supporto.carter DX
7	6313132	B	Vite TC C.E. M5x14
8	6331105	T	Rosetta piana ∅ 5,3
9	6332305	B	Rosetta dentata
10	6313130	V	Vite TC C.E. 5x10
11	6478500	M	Magnete Varec
12	0674967	X	Supporto magneti
13	7454046	K	Vite TS 3x10
14	0674563	D	Gruppo aggancio
15	6313115	W	Vite TC C.E. 4x10
16	6331104	X	Rosetta piana ∅ 4,3
17	6332304	F	Rosetta dentata ∅ 4,3
18	0675239	J	Perno
19	0675238	N	Perno
20	6337114	V	Anello Benzing
21	0819147	Q	Squadretta per chiusura
-	0676159	W	AG. Basamento
22	0674991	Z	Basamento
23	6476416	V	Ruota fissa
24	6476400	S	Ruota pivotata
-	0674593	Q	AP. Gruppo piede
25	0674943	U	Vite per piede
26	0674944	R	Piede
27	6337120	Y	Anello di tenuta
28	6321120	N	Dado M20
29	6313148	W	Vite TC C.E. 6x12
30	6332106	K	Rosetta elastica 6,4
31	6321106	E	Dado M6
32	6313116	A	Vite TC C.E. M4x12
33	0674694	F	Guarnizione passacavo
34	3151925	K	Collante Bostik
-	0676164	S	AG. Cassetto coriandoli
35	0676166	A	Mensola
36	0676169	X	Guida cassetto
37	0674998	X	Perno
38	6337111	Y	Anello Benzing
39	0674999	T	Molla
40	9852069	T	Gommino par.
41	0676172	A	Cassetto
42	0677293	H	Supporto molla
43	6313116	A	Vite TC C.E. M4x12
44	6321104	W	Dado M4
45	0674956	S	Gonna
46	0674953	V	Gonna
47	6331110	N	Rondella piana ∅ 10,5
48	0676285	A	Blocchetto
49	5223525	S	Microswitch
50	6311237	S	Vite TC M3x25
51	6331103	A	Rondella ∅ 3,2
52	6332103	N	Rondella ∅ 3,2
53	6321103	M	Dado M3

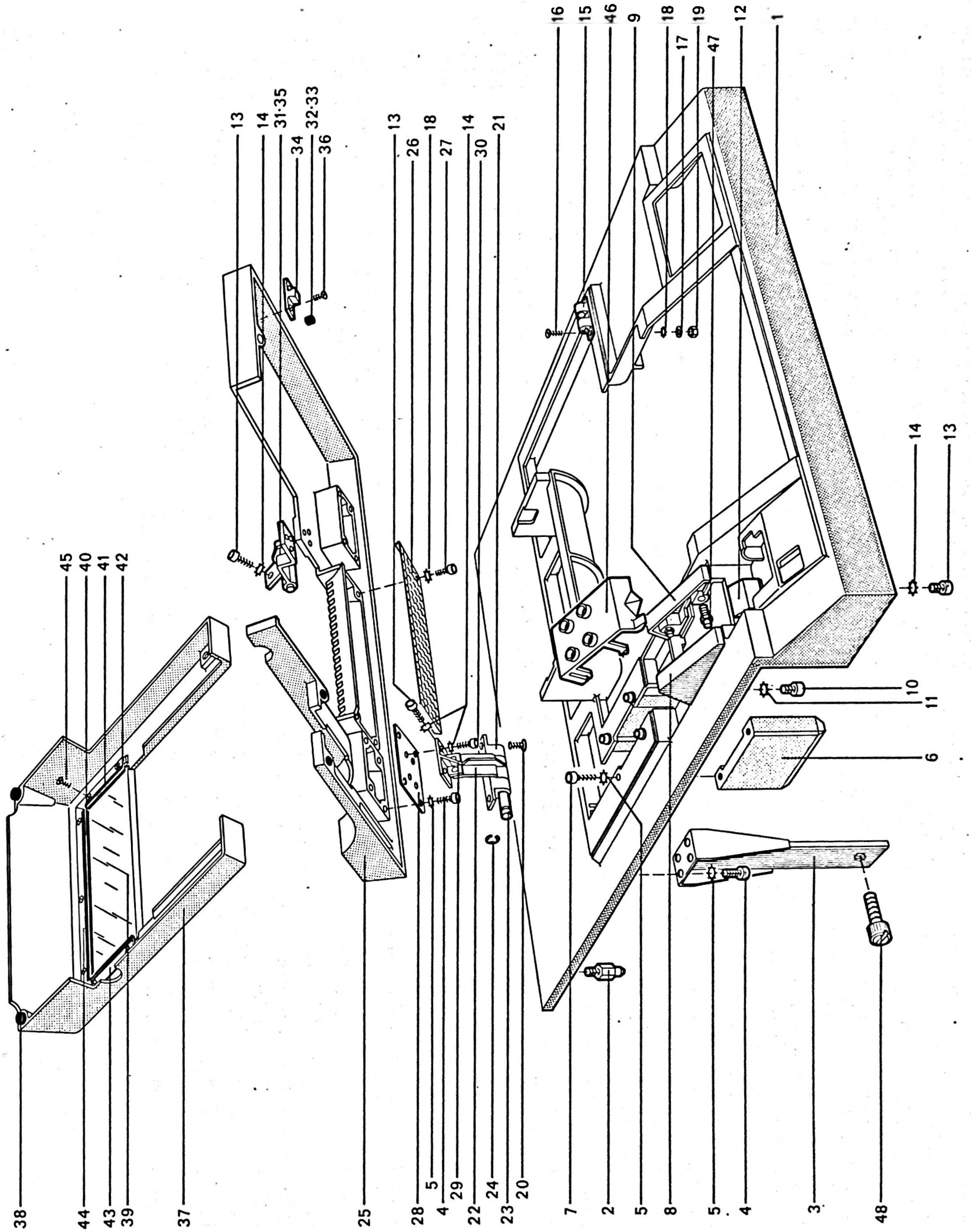


-	0674961 N	AG. Pannello anteriore
-	0674962 S	AG. Pannello posteriore
1	0676185 G	Pannello anteriore
2	0676232 G	Profilo pannello anteriore
3	6348302 H	Vite autofilettante 3,58x6,35
4	6478501 N	Piastrina per magnete
5	6348334 B	Vite autofilettante TS 3,58x6,35
6	0674605 E	Aggancio pannello
7	6332304 F	Rosetta dentata
8	6313114 S	Vite TC C.E. 4x8
9	0677177 F	Pannello posteriore
10	0676183 P	Profilo per pannello posteriore
11	0674770 Z	Contatto di massa
12	6313102 L	Vite TC C.E. 3x10
13	6331103 A	Rondella piana ∅ 3,2
14	0677950 Y	Tappo can; cavi
15	0676211 S	Guida nastro
16	0674319 N	Omega aggancio
17	6313130 V	Vite TC C.E. 5x10
18	6332105 F	Rondella elastica ∅ 5,4
19	0817241 Q	Assieme copertura laterale
20	6348390 R	Vite autofilettante TC 3,9x9,5
21	1925550 J	Vite autofilettante TC 3,9x6,5
-	0676207 N	AG. Semiguscio
22	0676208 B	Semiguscio inferiore
23	0676210 Z	Profilo
24	6313114 S	Vite TC C.E. 4x8
25	6475706 V	Rosetta elastica ∅ 4,3
26	0005343 D	Vite autofil. ∅ 4,2x9,5



Copertura superiore (CON 480)

-	0674963 W	AG. Carter
1	0676257 F	Carter
2	0676259 Y	Perno di centratura
3	0676260 W	Staffa
4	6313130 V	Vite TC C.E. 5x10
5	6332305 B	Rosetta dentata
6	0676263 F	Supp. nastro
7	6313132 B	Vite TC C.E. 5x12
8	0676265 Y	Fianchetto SX
9	0676269 Z	Fianchetto DX
10	6313146 D	Vite TC C.E. 6x10
11	6332306 P	Rosetta dentata ∅ 6,4
12	0676272 C	Blocchetto
13	6313115 W	Vite TC C.E. 4x10
14	6332304 F	Rosetta dentata ∅ 4,3
15	6478412 M	Scrocco 9x50
16	0680715 Q	Vite TS 2,6x14
17	6331103 A	Rosetta piana ∅ 3,2
18	6332303 J	Rosetta dentata ∅ 3,2
19	0682081 W	Dado 2,6 MA
20	6312757 J	Vite TS 5x14
-	0677273 G	AP. Cerniera
21	0676274 V	Supporto
22	0676276 D	Cerniera
23	0676278 W	Perno
24	6337112 C	Anello Seeger
-	0674964 K	AG. Copertura carter
25	0676241 V	Copertura
26	0676242 H	Lamiera UL
27	6313100 F	Vite TC C.E. 3x6
28	0676243 D	Piastrina
29	0676245 W	Squadretta
30	6313116 A	Vite TC C.E. 4x12
31	0676247 E	Cerniera DX
32	0675264 T	Gommino paracolpi
33	3151925 K	Bostik
34	6478410 G	Scrocco
35	0676255 X	Cerniera SX
36	7454024 H	Vite 2,6x6
-	0674965 P	AG. Copertura sup.
37	0676233 C	Copertura sup.
38	0005338 S	Gommino
39	0676235 V	Perspex
40	0676237 D	Guarnizione
41	0676236 H	Guarnizione
42	0676238 S	Piastrina DX
43	0676239 W	Piastrina SX
44	0676240 U	Piastrina centrale
45	6312742 L	Vite TS 4x6
46	0818155 D	Consolina
47	0676268 V	Perno
48	0674159 N	Nottolino


31·35
32·33

GIT 100

1	0616018	F	Piastrina	ICRE
2	0611428	S	"	INPO.E
3	0615213	Y	"	CAL. 4A
4	0615210	P	"	CAP 1A
5	0615211	Q	"	CAP 2A
6	0615212	U	"	CAP 3A
7	0615217	Z	"	CAP 4.
8	0610188	Z	"	IMGE
9	0612027	J	"	FLIP A
10	0612021	H	"	FLIP B
11	0612039	C	"	FLIP D
12	0612322	A	"	GEMAC
13	0617316	F	"	LUME A
14	0612149	W	"	MUTE A
15	0611500	F	"	NORA
16	0611501	G	"	NORE
17	0611509	A	"	NORR BO
18	0611511	V	"	NORR CA
19	0611512	H	"	NORR DA
20	0611508	E	"	NORR DD
21	0611510	U	"	NORR DS
22	0611503	Q	"	NORS A
23	0611519	X	"	REDI
24	0615335	M	"	TORE G
25	0617240	S	"	ULUN A
26	0612130	S	"	UNIV A
27	0611505	H	"	RIGE
28	0616020	H	"	FICO D

MEM 150

29	0612039	C	Piastrina	FLIP Ø D
30	0615211	Q	"	CAP 2
31	0610217	X	"	MEMO 2A
32	0611501	G	"	NOR-E
33	0615213	Y	"	CAL 4A
34	0611420	T	"	INPO
35	0612130	S	"	UNIV
36	0610230	P	"	ALMO
37	0616020	H	"	FICO D

COND. MEM 150

38	5006285	N	Cond.	820 PF
39	5006396	V	"	1500 PF
40	5021935	R	"	390 PF

MEM 160

41	0615213	Y	Piastrina	CAL 4A
42	0615212	U	"	CAP 3A
43	0611501	G	"	NORE
44	0612130	S	"	UNIV A
45	0616020	H	"	FICO H
46	0611420	T	"	INPO A
47	0617120	W	"	INTE A
48	0616034	G	"	FILU A
49	0612038	W	"	FLIP 1
50	0615230	R	"	GE 14
51	0611504	D	"	LOBE
52	0618014	X	"	MAME
53	0612144	Z	"	MOBE Ø B
54	0614128	R	"	PIME
55	0613021	D	"	PREA
56	0614024	X	"	INIB

COND. GIT 100

57	5006396	V	Cond.	1500 PF
58	5006285	N	"	820 PF
59	0000922	A	"	1,8 µF
60	5037435	G	"	10 µF
61	5031055	S	"	1 µF
62	0001953	A	"	3,300 PF

REPERTORIO NUMERICO

Codice	Pag.	Rif.
0000730H	10	13
0000849Y	10	22
0000867H	8	15
0000922A	24	59
0001102L	10	15
0001103Q	10	14
0001123E	10	16
0001124T	10	17
0001149S	14	27
0001151Z	14	28
0001154W	14	12
0001155S	14	24
0001156E	14	23
0001160Z	14	15
0001161S	14	14
0001162E	14	17
0001163A	14	18
0001218V	10	45
0001218V	16	5
0001238X	10	43
0001243X	16	8
0001244X	10	47
0001244V	16	7
0001259V	10	46
0001262G	10	44
0001292K	12	6
0001315S	10	2
0001373F	12	5
0001511D	14	16
0001614C	8	3
0001641A	10	7
0001663L	10	6
0001822H	10	4
0001823D	14	13
0001858W	16	4
0001876F	8	11
0001953A	24	62
0005176H	10	18
0005192J	8	47
0005338S	22	38
0005343D	20	26
0610188Z	24	8
0610217X	24	31
0610230P	24	36
0611420T	24	34
0611420T	24	46
0611428S	24	2
0611500F	24	15
0611501G	24	16
0611501G	24	32
0611501G	24	43
0611503Q	24	22
0611504D	24	51
0611505H	24	27
0611508E	24	20
0611509A	24	17
0611510U	24	21
0611511V	24	18
0611512A	24	19
0611519X	24	23
0612021A	24	10
0612027J	24	9
0612038W	24	49
0612039C	24	11
0612039C	24	29
0612130S	24	26
0612130S	24	35
0612130S	24	44
0612144Z	24	53
0612149W	24	14
0612322A	24	12
0613021D	24	55
0614024X	24	56
0614128R	24	54
0615210P	24	4
0615211Q	24	5
0615211Q	24	30
0615212U	24	6
0615212U	24	42
0615213Y	24	3
0615213Y	24	33
0615213Y	24	41
0615217Z	24	7
0615230R	24	50
0615335M	24	24
0616018F	24	1
0616020A	24	28
0616020A	24	37
0616020A	24	45
0616034G	24	48
0617120W	24	47
0617240S	24	25
0617316F	24	13
0618014X	24	52
0643202R	16	AG
0643377B	14	AG

Mod. 0953

Codice	Pag.	Rif.
0643379U	16	AG
0643380A	16	AG
0643381B	16	AG
0643394H	12	AG
0645390U	6	37
0674140M	8	40
0674146Y	8	41
0674159N	8	39
0674159N	22	48
0674222X	4	22
0674319N	20	16
0674563D	18	14
0674593Q	18	AP
0674605E	20	6
0674694F	18	33
0674770Z	20	11
0674900T	8	
0674901U	8	21
0674902G	8	20
0674943U	18	25
0674944R	18	26
0674953V	18	46
0674956S	18	45
0674961N	20	AG
0674962S	20	AG
0674963H	22	AG
0674964K	22	AG
0674965P	22	AG
0674967X	18	12
0674991Z	18	22
0674998X	18	37
0674999T	18	39
0675228M	45	47
0675238N	18	19
0675239J	18	18
0675264T	22	32
0676158S	18	1
0676159W	18	AG
0676160U	18	5
0676162A	18	6
0676164S	18	AG
0676166A	18	35
0676169X	18	36
0676172A	18	41
0676183P	20	10
0676185G	20	1
0676189N	8	1
0676190F	8	2

Codice	Pag.	Rif.
0676192L	8	AG
0676203M	8	43
0676204A	8	44
0676205E	8	45
0676206J	8	46
0676207N	20	AG
0676208B	20	22
0676210Z	20	23
0676211S	20	15
0676214X	4	2
0676217B	4	4
0676218Y	4	1
0676218Y	6	1
0676223B	6	10
0676224Y	4	3
0676225U	4	38
0676226G	4	AG
0676227C	4	23
0676228Z	45	AG
0676228Z	6	AG
0676229V	45	49
0676229V	6	41
0676230T	45	50
0676230T	6	42
0676232G	20	2
0676233C	22	37
0676235V	22	39
0676236A	22	41
0676237D	22	40
0676238S	22	42
0676239W	22	43
0676240U	22	44
0676241V	22	25
0676242A	22	26
0676243D	22	28
0676245W	22	29
0676247E	22	31
0676255X	22	35
0676257F	22	1
0676259Y	22	2
0676260W	22	3
0676263F	22	6
0676265Y	22	8
0676268V	22	47
0676269Z	22	9
0676272C	22	12
0676274V	22	21
0676276D	22	22

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Codice	Pag.	Rif.
0676278W	22	23
0676279S	16	2
0676284E	16	1
0676285A	18	48
0676287J	14	1
0676288F	16	3
0677177F	20	9
0677273G	22	AP
0677293H	18	42
0677950Y	20	14
0680228U	4	34
0680311X	6	30
0680534D	6	33
0680534D	8	32
0680534D	12	11
0680715Q	22	16
0682081W	22	19
0682160C	4	37
0682260E	12	13
0682454P	4	35
0682456X	6	34
0682560C	6	31
0682865D	8	10
0683041N	10	40
0683060P	4	36
0683081S	8	33
0683081S	12	12
0683086F	6	35
0683131E	6	32
0683542T	8	9
0685436T	8	34
0689526L	10	19
0800880Z	14	22
0817241Q	20	19
0818155D	22	46
0819126J	14	9
0819127N	14	10
0819128B	14	7
0819129F	14	6
0819130D	14	5
0819131E	6	25
0819147Q	18	21
0819152L	12	1
0831062U	8	16
0831063Y	8	17
0831791Y	14	4
0831792C	14	3
0831797H	14	2

Codice	Pag.	Rif.
0831805P	14	8
0834000S	45	48
0834000S	6	11
0834007C	4	16
0834007C	6	14
0834008Z	4	15
0834008Z	6	16
0834009V	4	14
0834009V	6	13
0834397W	6	7
0834397W	12	14
0834397W	14	19
0834416U	6	8
0834416U	12	15
0834416U	14	20
0834473S	4	11
0834474P	4	12
0834478K	4	8
0834478K	6	6
0834661Q	4	24
0834661Q	6	43
0834662U	4	7
0834662U	6	4
0834663Y	4	5
0834663Y	6	2
0834665R	4	25
0834665R	6	44
0835132C	4	6
0835132C	6	3
0835484X	4	AG
0835484X	6	AG
0836915R	10	49
0836918Q	10	1
0836919L	10	42
0836923T	10	48
0836925L	10	5
0836926Y	4	27
0836927U	4	28
0836928R	4	29
0836929M	4	30
0836930K	6	38
0836931L	6	40
0836932Y	4	31
0836952S	10	23
0836953W	10	52
0837215Q	8	13
0837664Z	8	5
0837742G	6	39

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Codice	Pag.	Rif.
0837773F	12	3
0837774D	12	2
0837894Z	4	13
0838039M	10	41
0838137M	10	24
0838723X	8	12
0839165C	12	4
0839337M	10	27
0839356K	8	19
0839357P	10	26
0839609V	4	44
0839610P	4	45
0839612U	4	46
0839653D	8	18
0839653D	10	25
0839927R	4	9
0839927R	6	17
0839933R	4	10
0842251P	4	AG
0842252T	4	43
0842491F	10	AP
0842609G	8	AG
0842638T	8	7
0842984W	10	AP
0842985S	10	AG
0842986E	10	AG
1925110E	14	21
1925550J	20	21
3151925R	4	26
3151925K	6	45
3151925K	18	34
3151925K	22	33
3332104B	10	36
3361209U	8	42
3443120F	10	50
3543104P	10	28
3543106X	12	16
4962958N	10	8
4962961R	8	6
5006285N	24	38
5006285N	24	58
5006396V	24	39
5006396V	24	57
5021935R	24	40
5031055S	24	61
5037435G	24	60
5141504J	14	11
5223525S	18	49

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5375110F	16	6
5427068F	12	7
5472101G	10	3
5541340N	8	4
5612447M	10	20
5612540D	8	14
5612999E	10	21
5618052C	8	26
5618052C	10	51
5618054V	6	29
5618320N	8	22
5618320N	10	29
5621697K	8	36
6311230Q	4	19
6311230Q	6	12
6311231R	10	9
6311232V	6	22
6311237S	18	50
6311242W	4	17
6311242W	6	S
6311242W	8	37
6311242W	10	35
6311243S	12	9
6311244P	6	26
6311244P	8	27
6311245K	10	34
6311247T	8	23
6311257U	10	30
6312725F	8	8
6312733P	12	8
6312742L	22	4S
6312757J	22	20
6313100F	22	27
6313102L	20	12
6313114S	20	8
6313114S	20	24
6313115W	18	15
6313115W	22	13
6313116A	18	32
6313116A	18	43
6313116A	22	30
6313130V	10	53
6313130V	18	10
6313130V	20	17
6313130V	22	4
6313132B	4	39
6313132B	6	18
6313132B	18	7

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6313132B	22	7
6313134U	14	25
6313146D	22	10
6313148W	18	2
6313148W	18	29
6321103H	4	21
6321103A	8	31
6321103A	10	12
6321103M	18	53
6321104W	6	28
6321104W	8	35
6321104W	10	38
6321104W	18	44
6321105S	4	42
6321105S	6	21
6321105S	10	33
6321106E	18	31
6321120N	18	28
6331103A	4	33
6331103A	6	23
6331103A	8	29
6331103A	10	10
6331103A	18	51
6331103A	20	13
6331103A	22	17
6331104X	6	27
6331104X	8	25
6331104X	10	37
6331104X	18	16
6331105T	4	40
6331105T	6	19
6331105T	10	31
6331105T	14	26
6331105T	18	8
6331106F	18	4
6331110N	18	47
6332103N	4	20
6332103N	6	15
6332103N	6	24
6332103N	8	30
6332103N	10	11
6332103N	18	52
6332104B	4	18
6332104B	6	9
6332104B	6	36
6332104B	8	24
6332104B	12	10
6332105F	4	41

Codice	Pag.	Rif.
6332105F	6	20
6332105F	10	32
6332105F	20	18
6332106K	18	30
6332303J	22	18
6332304F	8	38
6332304F	18	17
6332304F	20	7
6332304F	22	14
6332305B	18	9
6332305B	22	5
6332306P	18	3
6332306P	22	11
6337111Y	18	38
6337112C	22	24
6337114V	18	20
6337120Y	18	27
6348302A	20	3
6348334B	20	5
6348390R	20	20
6475706V	20	25
6476400S	18	24
6476416V	18	23
6478410G	22	34
6478412M	22	15
6478500M	18	11
6478501N	20	4
7454024H	22	36
7454046R	18	13
7454236P	4	32
7454708R	10	39
7454750B	8	28
9852069T	18	40